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REVIEWS

Ethel Churchill, or, the Two Brides. By Miss Landon. 3 vols. Colburn.

We find in the prose writings of Miss Landon the same warmth of feeling as in her verse. The language only is changed; the genius that prompts it is the same. But the qualities that have established her fame as a poetess, occasionally interfere with the full developement of her powers as a writer of novels. In all, we admit, there are fine and noble thoughts, beautifully expressed: her personages think wisely, tenderly, or romantically, as suits her purpose; they speak eloquently and wittily, but they seldom *act*. Her novels, in fact, are more records of feelings, than narratives of events. Instead of giving her full attention to working out a character, or unravelling an artfully involved plot, she pours forth from the fulness of her own heart a profusion of deep and eloquent reflections, which, though excellent in themselves, do not assist in the progress of the story. But readers must be more critical than we are disposed to be, if they find much fault with a habit from which they derive so much pleasure. These episodes indeed are the characteristics of Miss Landon's style; and, we confess, we would not exchange them for an improvement in the mere machinery of a novel.

'Ethel Churchill' contains many examples both of the beauties and the defects we have noticed. In such an abstract of it as we could find room for, we could not do justice to its merits; and we shall, therefore, not attempt any account of the plot. And yet, as we are anxious to give a specimen of the style of 'Ethel Churchill,' we must inform the reader, that the real heroine of the book is a certain Henrietta, Countess of Marchmont, whose character of a gay, beautiful leader of fashionable life, full of wit, and with a recklessness of manner which fails to hide even from herself the pangs of a too sensitive heart—stands in admirable contrast with the stiff, pompous, and self-conceited nothingness of her lord and master. This lady, soon after her marriage, becomes acquainted with Lady Mary Wortley Montagu, Pope, Gay, and the other wits of the period, who are brought very vividly before us; and has proceeded to such lengths in follies and flirtations, that she fears a rebuke from her husband for the levity which, she is conscious, cannot have escaped his observation. On the death of poor Constance Courtenay, which is very pathetically described, the Countess had paid her friend's memory the respect of wearing black clothes. While mourning over the melancholy fate of Constance—

"A rap at the door of her closet interrupted her soliloquy. 'I thought,' muttered she, 'that I had given strict orders that no one should be admitted—well, come in!' and Lord Marchmont made his appearance. 'The very person I most wished to see!' exclaimed Henrietta, starting up eagerly to receive him.

"'My dear Lady Marchmont, your energy is positively startling,' said he, slowly articulating his words, and deliberately seating himself in an arm-chair, which he moved twice, once to avoid the air from an open window, and next to avoid the sun.

"His wife well knew that it was in vain to speak till he had finished his arrangements for his personal comfort, and she solaced her impatience by tearing a rose to pieces.

"Lord Marchmont was about thirty years of age, and what is generally called a fine-looking man. His figure was good, as far as his height and proportion went, but his movements wanted ease, and, consequently, grace; and there was something of self-importance in his air—the last thing in the world to prepossess a beholder in his favour. We may admit the superiority of another, but we very much object to their assuming it as an undeniable fact. His features were high and good, with a strongly marked aquiline nose; but the mouth neither gave sweetness, nor the eye light, to his face. His eyes were of a cold dim blue, that never seemed to vary; they were unfamiliar with tears, and the pupil never brightened with laughter. His lips were thin, and, when they did smile, it was stiff, and made up like the embroidery on his coat. His dress was splendid; his hands glittered with rings, his snuff-box was covered with diamonds, and his ruffles were of the finest Mechlin lace. The only fault was the want of harmony in colouring; the one hue destroyed the effect of the other. I am persuaded, that where there is no eye for colours, something of that keen susceptibility is wanting, which constitutes the poetical and picturesque; and, certainly, to neither of these qualities had his lordship the slightest claim. His style of conversation was made up of set sentences; and his manner, what his inferiors called overbearing, and his equals tiresome. His mind was made up of lessons and examples; he only reasoned by precedents; everything with him went by example, and it was a relief to him when he could quote an authority. If he had a passion, it was love of money: he loved it both for its own sake—that close kind of attachment which money certainly does inspire—and also for the enjoyments that it could procure. He liked the pleasures of the table, and he liked attendance; he was a sort of Sublime Porte to his valets. Generally speaking, his comprehension was slow, and his ideas narrow, but the moment his own interest was concerned, it was astonishing how his perception enlarged: he became cautious, if not enlightened: and cunning, if not shrewd. In short, his character might be summed up in a word—Lord Marchmont was an intensely selfish man.

"Being, at length, comfortably settled in his *fauteuil*, one foot balanced on a chair, and the other reposed on a stool, his snuff-box opened, and his perfumed handkerchief ready,—Henrietta thought that she might begin to speak.

"'I wanted so much to see you,' exclaimed she.

"'Very flattering,' replied his lordship, with a grave inclination.

"'I have so much,' continued she, 'to talk to you about.'

"'Perhaps, madam,' interrupted Lord Marchmont, in a slow and solemn tone, 'you will accord me my privilege of speaking first. I have also much to say to you.'

"It was now Henrietta's turn to seek a comfortable position; and, sinking back on the sofa, she began to pick another rose to pieces. To this his lordship paid no attention, he had a certain number of words to say, and the idea never crossed him but that they must be of paramount interest. He rarely looked at the person to whom he was talking; his glance dwelt either on his feet, or his hands, or his snuff-box—something, in short, that was more peculiarly his own; to say nothing of occasional glances at the looking-glass opposite. He talked as if he were reading aloud, and that in the most monotonous manner.

"'It is my duty, madam, to tell you,' he began, in a solemn tone, 'that I exceedingly disapprove of your conduct.'

"Henrietta's colour rose. 'This is the first time I have heard of it,' exclaimed she; 'if you——'

"'Pray, madam, do not interrupt me,' said Lord Marchmont; 'you may be quite sure that I never make an assertion which I am not prepared to prove. I again repeat, that I exceedingly disapprove of your conduct, in which I am more surprised you should persist, as you are aware of my complete disapprobation.'

"'What have I done?' asked his listener.

"'Again, madam, am I under the necessity of requesting that you will abstain from interruption. The petulance of your sex is especially shown in trifles. As I heard his Grace the Duke of Wharton observe only yesterday,—"Women never will listen." This was his remark while we were walking in the Mall together; and I could not but be struck by its profound truth. I am not above being instructed, whatever, madam, you may think to the contrary."

"Henrietta bit her lip to prevent herself from saying, that the task of instruction appeared to her, in this instance, a very hopeless one; and his Lordship went on to observe,—'I am sorry to see that, this morning even, you persist in disobeying me. I repeat, that I entirely disapprove of your line of conduct.'

"'Why, what am I doing now but listening to you? Is that what you disapprove?'

"'To listen to me, madam, is your duty, though,' said he, in a voice growing every moment more solemn, 'I regret to say, that you pay but little attention to it. Again I assert, that I have only too much reason to complain of your conduct.'

"It is rather alarming, in a conjugal *tête-à-tête*, when your husband tells you he only comes to complain of your conduct, and Lord Marchmont's severity of aspect was quite awful; however, Henrietta only gave him a look of inquiry, and he went on:—'It was full three days ago that I told you how I hated the sight of black, yet you wore it yesterday evening, and I observe that your ribands are black this morning.'

"Tears started in the countess's eyes, but she repressed them, and, forcing a smile, said, 'I am glad to find that it is not my conduct, but my dress, that meets your disapprobation.'

"'I thought,' replied her husband, 'and the event proves that I was right in so thinking, that you would only laugh at what I should urge; but women are incapable of a serious thought!'

"'Well!' returned Lady Marchmont, 'at all events, you must allow me to be flattered at the interest you take in my personal appearance!'"

The character on which Miss Landon appears to have bestowed the highest finish, and which she has traced, through all its fortunes, with the greatest care, is that of Walter Maynard. In the possession of high talent, and filled with the purest feelings, the young dependant on literary exertion soon finds that the acquisition of fame must be purchased by the loss of happiness. Poor and friendless, he has to struggle with a world where any degree of reputation seems only to incite the attacks of malevolence; and at last, sick and pennyless, every prospect blighted, he dies. The picture of Walter Maynard, we hope, is too darkly coloured: yet it is on the distresses of the aspiring author that the deepest sympathies of Miss Landon are bestowed. We sincerely trust that it is not from experience that she speaks in the following passage:—

"How constantly has mortification accompanied triumph! With what secret sorrow has that praise been received from strangers, denied to us by our friends! Nothing astonishes me more than the envy which attends literary fame, and the unkindly depreciation which waits upon the writer: of every species of fame, it is the most ideal and apart; it would seem to interfere with no one. It is bought by a life of labour; generally, also, of seclusion and privation,

It asks its honour only from all that is most touching, and most elevated in humanity. What is the reward that it craves?—to lighten many a solitary hour, and to spiritualize a world, that were else too material. What is the requital that the Athenians of the earth give to those who have struggled through the stormy water, and the dark night, for their applause?—both reproach and scorn. If the author have—and why should he be exempt from?—the faults of his kind, with what greedy readiness are they seized upon and exaggerated! How ready is the sneer against his weakness or his error! What hours of feverish misery have been past! What bitter tears have been shed over the unjust censure, and the personal sarcasm!

"The imaginative feel such wrong far beyond what those of less sensitive temperament can dream. The very essence of a poetical mind is irritable, passionate, and yet tender, susceptible, and keenly alive to that opinion which is the element of its existence. These may be faults; but they are faults by which themselves suffer most, and without which they could not produce their creations. Can you bid the leopard leave his spots, and yet be beautiful?"

Memoirs of the Life of Sir Walter Scott, Bart. Vol. V. Edinburgh: Cadell.

We received this volume so late, that we were half inclined to defer all notice of it till next week; but on consideration, and as a relief to the dulness of the season, we have resolved to avail ourselves of a few pleasant extracts. Our first will introduce the reader to a party at Abbotsford, and give him a taste of the quality of the host's hospitality, and the friends assembled around him. Here is a grand coursing match on Newark Hill:—

"The only guest who had chalked out other sport for himself was the staunchest of anglers, Mr. Rose; but he, too, was there on his *shelty*, armed with his salmon-rod and landing-net, and attended by his humorous squire Hinves, and Charlie Purdie, a brother of Tom, in those days the most celebrated fisherman of the district. This little group of Waltonians, bound for Lord Somerville's preserve, remained lounging about to witness the start of the main cavalcade. Sir Walter, mounted on Sibyl, was marshalling the order of procession with a huge hunting-whip, and among a dozen frolicsome youths and maidens, who seemed disposed to laugh at all discipline, appeared, each on horseback, each as eager as the youngest sportsman in the troop, Sir Humphry Davy, Dr. Wollaston, and the patriarch of Scottish belles-lettres, Henry Mackenzie. The Man of Feeling, however, was persuaded with some difficulty to resign his steed for the present to his faithful negro follower, and to join Lady Scott in the sociable, until we should reach the ground of our *battue*. Laidlaw, on a long-tailed wiry Highlander, yclept *Hoddin Grey*, which carried him nimbly and stoutly, although his feet almost touched the ground as he sat, was the adjutant. But the most picturesque figure was the illustrious inventor of the safety-lamp. He had come for his favourite sport of angling, and had been practising it successfully with Rose, his travelling companion, for two or three days preceding this, but he had not prepared for coursing fields, or had left Charlie Purdie's troop for Sir Walter's on a sudden thought, and his fisherman's costume—a brown hat with flexible brims, surrounded with line upon line of catgut, and innumerable fly-hooks—jack-boots worthy of a Dutch smuggler, and a fustian surtout dabbled with the blood of salmon, made a fine contrast with the smart jackets, white-cord breeches, and well polished jockey-boots of the less distinguished cavaliers about him. Dr. Wollaston was in black, and with his noble serene dignity of countenance, might have passed for a sporting archbishop. Mr. Mackenzie, at this time in the 76th year of his age, with a white hat turned up with green, green spectacles, green jacket, and long brown leathern gaiters buttoned upon his nether anatomy, wore a dog-whistle round his neck, and had all over the air of as absolute a devotee as the gay captain of Huntly Burn. Tom Purdie and his subalterns had preceded us by a few hours with all the greyhounds that could be collected at Abbotsford, Darnick, and Melrose; but the giant Maida had remained as his master's orderly, and now gambolled about Sibyl Grey, barking for mere joy like a spaniel puppy. * *

"On reaching Newark Castle, we found Lady Scott, her eldest daughter, and the venerable Mackenzie, all busily engaged in unpacking a basket that had been placed in their carriage, and arranging the luncheon it contained upon the mossy rocks overhanging the bed of the Yarrow. When such of the company as chose had partaken of this refection, the Man of Feeling resumed his pony, and all ascended the mountain, duly marshalled at proper distances, so as to beat in a broad line over the heather, Sir Walter directing the movement from the right wing—towards Blackandro. Davy, next to whom I chanced to be riding, laid his whip about the fern like an experienced hand, but cracked many a joke, too, upon his own jack-boots, and surveying the long eager battalion of bush-rangers, exclaimed 'Good heavens! is it thus that I visit the scenery of the Lay of the Last Minstrel?' He then kept muttering to himself, as his glowing eye—(the finest and brightest that I ever saw)—ran over the landscape, some of those beautiful lines from the *Conclusion* of the Lay—

> —"But still,
> When summer smiled on sweet Bowhill,
> And July's eve, with balmy breath,
> Waved the blue-bells on Newark heath,
> When throstles sung in Hareheadshaw,
> And corn was green on Carterhaugh,
> And flourished, broad, Blackandro's oak,
> The aged harper's soul awoke," &c.

Mackenzie, spectacled though he was, saw the first sitting hare, gave the word to slip the dogs, and spurred after them like a boy. All the seniors, indeed, did well as long as the course was upwards, but when puss took down the declivity, they halted and breathed themselves upon the knoll—cheering gaily, however, the young people, who dashed at full speed past and below them. Coursing on such a mountain is not like the same sport over a set of fine English pastures. There were gulfs to be avoided, and bogs enough to be threaded—many a stiff nag stuck fast—many a bold rider measured his length among the peat-hags—and another stranger to the ground besides Davy plunged neck deep into a treacherous well-head, which, till they were floundering in it, had borne all the appearance of a piece of delicate green turf. When Sir Humphry emerged from his involuntary bath, his habiliments garnished with mud, slime, and mangled water-cresses, Sir Walter received him with a triumphant *encore!* But the philosopher had his revenge, for joining soon afterwards in a brisk gallop, and Scott put Sibyl Grey to a leap beyond her prowess, and lay humbled in the ditch, while Davy, who was better mounted, cleared it and him at a bound. Happily there was little damage done—but no one was sorry that the sociable had been detained at the foot of the hill."

As we are now at Abbotsford, we may as well follow Mr. Lockhart's guidance, and make mention of two annual festivals, when sport was a pretext for assembling neighbours:—

"One was a solemn bout of salmon-fishing for the neighbouring gentry and their families, instituted originally, I believe, by Lord Somerville, but now, in his absence, conducted and presided over by the Sheriff. Charles Purdie, already mentioned, had charge (partly as lessee) of the salmon fisheries for three or four miles of the Tweed, including all the water attached to the lands of Abbotsford, Gala, and Allwyn: and this festival had been established with a view, besides other considerations, of recompensing him for the attention he always bestowed on any of the lairds or their visitors that chose to fish, either from the banks or the boats, within his jurisdiction. His selection of the day, and other precautions, generally secured an abundance of sport for the great anniversary; and then the whole party assembled to regale on the newly caught prey, broiled, grilled, and roasted in every variety of preparation, beneath a grand old ash, adjoining Charlie's cottage at Boldside, on the northern margin of the Tweed, about a mile above Abbotsford. This banquet took place earlier in the day or later, according to circumstances; but it often lasted till the harvest moon shone on the lovely scene and its revellers. * *

"Sometimes the evening closed with a 'burning of the water;' and then the Sheriff, though not so agile as when he practised that rough sport in the early times of Ashestiel, was sure to be one of the party in the boat,—held a torch, or perhaps took the helm,—and seemed to enjoy the whole thing as heartily as the youngest of his company."

Another great festival day was the birthday of his eldest son.

"This was a coursing-field on a large scale, including, with as many of the young gentry as pleased to attend, all Scott's personal favourites among the yeomen and farmers of the surrounding country. The Sheriff always took the field, but latterly devolved the command upon his good friend Mr. John Usher, the ex-laird of Totfield; and he could not have had a more skilful or a better-humoured lieutenant. The hunt took place either on the moors above the Cauld-Shields Loch, or over some of the hills on the estate of Gala, and we had commonly, ere we returned, hares enough to supply the wife of every farmer that attended with *soup* for a week following. The whole then dined at Abbotsford, the Sheriff in the chair, Adam Ferguson croupier, and Dominie Thomson, of course, chaplain. George, by the way, was himself an eager partaker in the preliminary sport; and now he would favour us with a grace, in Burns' phrase, 'as long as my arm,' beginning with thanks to the Almighty, who had given man dominion over the fowls of the air, and the beasts of the field, and expatiating on this text with so luculent a commentary, that Scott, who had been fumbling with his spoon long before he reached his Amen, could not help exclaiming as he sat down, 'Well done, Mr. George, I think we've had every thing but the view holla!' The company, whose onset had been thus deferred, were seldom, I think, under thirty in number, and sometimes they exceeded forty. The feast was such as suited the occasion—a baron of beef, roasted, at the foot of the table, a salted round at the head, while tureens of hare-soup, hotchpotch, and cockeyleekie extended down the centre, and such light articles as geese, turkeys, entire sucking pigs, a singed sheep's head, and the unfailing haggis, were set forth by way of side-dishes. Blackcock and moorfowl, bushels of snipe, *black puddings*, *white puddings*, and pyramids of pancakes, formed the second course. Ale was the favourite beverage during dinner, but there was plenty of port and sherry for those whose stomachs they suited. The quaigs of Glenlivet were filled brimful, and tossed off as if they held water. The wine decanters made a few rounds of the table, but the hints for hot punch and toddy soon became clamorous. Two or three bowls were introduced, and placed under the supervision of experienced manufacturers—one of these being usually the Ettrick Shepherd,—and then the business of the evening commenced in good earnest. The faces shone and glowed like those at Camacho's wedding: the chairman told his richest stories of old rural life, Lowland or Highland; Ferguson and humbler heroes fought their battles o'er again; the stalwart Dandie Dinmonts lugged out their last winter's snow-storm, the parish scandal, perhaps, or the dexterous bargain of the Northumberland *tryste*; and every man was knocked down for the song that he sung best, or took most pleasure in singing. Sheriff-substitute Shortreed,—(a cheerful hearty little man, with a sparkling eye and a most infectious laugh)—gave us *Dick o'the Cow*, or, *Now Liddesdale has ridden a raid*; a weatherbeaten, stiff-bearded veteran, *Captain* Ormistoun, as he was called (though I doubt if his rank was recognised at the Horse Guards), had the primitive pastoral of *Cowdenknowe* in sweet perfection; Hogg produced *The women folk*, or, *The Kye comes hame*, and, in spite of many grinding notes, contrived to make every body delighted, whether with the fun or the pathos of his ballad; the Melrose doctor sang in spirited style some of Moore's master-pieces; a couple of retired sailors joined in *Bould Admiral Duncan upon the high sea*;—and the gallant croupier crowned the last bowl with *Ale, good ale, thou art my darling!* Imagine some smart Parisian *savant*—some dreary pedant of Halle or Heidelberg—a brace of stray young lords from Oxford or Cambridge, or perhaps their prim college tutors, planted here and there amidst these rustic wassailers—this being their first vision of the author of Marmion and Ivanhoe, and he appearing as heartily at home in the scene as if he had been a veritable *Dandie* himself—his face

radiant, his laugh gay as childhood, his chorus always ready. And so it proceeded until some worthy, who had fifteen or twenty miles to ride home, began to insinuate that his wife and bairns would be sorely anxious about the fords, and the Dumples and Hoddins were at last heard neighing at the gate, and it was voted that the hour had come for *doch an dorrach*—the stirrup-cup—to wit, a bumper all round of the unmitigated *mountain dew*. How they all contrived to get home in safety Heaven knows—but I never heard of any serious accident except upon one occasion, when James Hogg made a bet at starting that he would leap over his wall-eyed pony as she stood, and broke his nose in this experiment of 'o'ervaulting ambition.' One comely good wife, far off among the hills, amused Sir Walter by telling him, the next time he passed her homestead after one of these jolly doings, what her husband's first words were when he alighted at his own door—'Ailie, my woman, I'm ready for my bed—and oh, lass (he gallantly added), I wish I could sleep for a towmont, for there's only ae thing in this warld worth living for, and that's the Abbotsford hunt!'"

These extracts will serve for the present week.

Ernest Maltravers. By the Author of 'Pelham,' &c. 3 vols. Saunders & Otley.

A romance that fails to make the heart throb is worth little: so, too, a novel, which we close without the mind having treasured up suggestion for after thought, is barren and unprofitable. The majority of readers, however, run through fictions of all sorts for the mere story. Hence, a work like 'Ernest Maltravers,' which is distinctively a work of thought, and written for thinkers, will find its fit audience, few in number, compared to those who hung breathless over the tale of Pompeii, or who felt their hearts burn within them, as they traced the career of the Roman patriot. It is, in fact, a book to be received, at first, by the many, on the report of the few. Mr. Bulwer owns to having purposely rejected and abstained from all the commoner colours, which the subject suggested. As an instance, the man of genius, Ernest Maltravers, is placed in a splendid position by birth, fortune, and connexion; and thus has to create his own adventures under the impulse of a restless and passionate temperament, rather than to struggle upward to experience and fame, through the "wrongs" of poverty, of hope deferred, and opportunity wrestled for with the eagerness of a life-and-death contest, in the midst of which

> Most wretched men
> Are cradled into poetry.

In all the accessory characters, too, Mr. Bulwer has no less pertinaciously avoided the familiar combinations which suggest themselves; he has dwelt on the exceptions and inconsistencies of human nature, rather than on the crimes and virtues, which, when well grouped, make a Rembrandt picture sure to strike at once—sure to please for ever by the force of contrast. Whether, in seeking to be profound, Mr. Bulwer has not sometimes stopped short at super-subtlety, we will not here attempt to determine; for even where we do not recognize the truth of conception, the very fineness of outline, the very delicacy of colouring, have a charm for us, as evidencing the skill of the artist's hand; and we shall look anxiously for that portion of 'Ernest Maltravers' yet to come, when the whirlwind of passion shall subside, and the man of genius come forth from the cloud and storm in which his fortunes are wrecked at the close of this story.

We are doubtful how best to introduce this work to our readers. To comment upon a character, as yet on the threshold of important developements, would lead us into prophecy—which we agree with Lord Brougham, in thinking "a dangerous expenditure of language." To unwind a plot full of loops and complications, each one of which must be disentangled to make the display intelligible and satisfactory, would require wider space than "time and the hour" accord us;—perhaps, without further preamble, we cannot do better than let Mr. Bulwer bring forward his own hero, and begin with the very beginning.

"Some four miles distant from one of our northern manufacturing towns, in the year 18—, was a wide and desolate common;—a more dreary spot it is impossible to conceive—the herbage grew up in sickly patches from the midst of a black and stony soil. Not a tree was to be seen in the whole of the comfortless expanse. Nature herself had seemed to desert the solitude, as if scared by the ceaseless din of the neighbouring forges, and even Art, which presses all things into service, had disdained to cull use or beauty from these unpromising demesnes. * * For miles along the moor you detected no vestige of any habitation; but as you approached the verge nearest to the town, you could just perceive at a little distance from the main road, by which the common was intersected, a small, solitary, and miserable hovel.

"Within this lone abode, at the time in which my story opens, were seated two persons. The one was a man of about fifty years of age, and in a squalid and wretched garb, which was yet relieved by an affectation of ill-sorted finery: a silk handkerchief, which boasted the ornament of a large brooch of false stones, was twisted jauntily round a muscular but meagre throat. His tattered breeches were also decorated by buckles, one of pinchbeck, and one of steel. His frame was thin, but broad and sinewy, indicative of considerable strength. His countenance was prematurely marked by deep furrows, and his grizzled hair waved over a low, rugged, and forbidding brow, on which there hung an everlasting frown that no smile from the lips (and the man smiled often) could chase away. It was a face that spoke of long-continued and hardened vice—it was one on which the Past had written indelible characters. The brand of the hangman could not have stamped it more plainly, nor have more unequivocally warned the suspicion of honest or timid men.

"He was employed in counting some few and paltry coins, which, though an easy enough matter to ascertain their value, he told and retold, as if the act could increase the amount. 'There must be some mistake here, Alice,' he said, in a low and muttered tone; 'we can't be so low—you know I had two pounds in the drawer but Monday, and now—— Alice, you must have stolen some of the money—curse you!'

"The person thus addressed sate at the opposite side of the smouldering and sullen fire; she now looked quietly up,—and her face singularly contrasted that of the man.

"She seemed about fifteen years of age, and her complexion was remarkably pure and delicate, even despite the sunburnt tinge which her habits of toil had brought it. Her auburn hair hung in loose and natural curls over her forehead, and its luxuriance was remarkable even in one so young. Her countenance was beautiful, nay, even faultless, in its small and childlike features—but the expression pained you—it was so vacant. In repose it was almost the expression of an idiot—but when she spoke, or smiled, or even moved a muscle, the eyes, colour, lips, kindled into a life which proved that the intellect was still there, though but imperfectly awakened....

"'I did not steal any, father,' she said, in a quiet voice, 'but I should like to have taken some, only I knew you would beat me if I did.'

"'And what do you want money for?'

"'To get food when I'm hungered.'

"'Nothing else?'

"'I don't know.'

"The girl paused—'Why don't you let me,' she said, after a while, 'why don't you let me go and work with the other girls at the factory? I should make money there for you and me both?' * *

"'Stuff!' said the man, angrily; 'I have three minds to——'

"Here he was interrupted by a loud knock at the door of the hovel.

"The man grew pale. 'What can that be?' he muttered. 'The hour is late—near eleven. Again—again! Ask who knocks, Alice.'

"The girl stood spell-bound a moment at the door; and as she stood, her form, rounded yet slight, her earnest look, her varying colour, her tender youth, and a singular grace of attitude and gesture, would have inspired an artist with the very ideal of rustic beauty.

"After a pause, she placed her lips to a chink in the door, and repeated her father's question.

"'Pray pardon me,' said a clear, loud, yet courteous voice, 'but seeing a light at your window, I have ventured to ask if any one within will conduct me to ****; I will pay the service handsomely.'

"'Open the door, Alley,' said the owner of the hut.

"The girl drew a large wooden bolt from the door; and a tall figure crossed the threshold.

"The new-comer was in the first bloom of youth, perhaps about eighteen years of age, and his air and appearance surprised both sire and daughter. Alone, on foot, at such an hour, it was impossible for any one to mistake him for other than a gentleman; yet his dress was plain, and somewhat soiled by dust, and he carried a small knapsack on his shoulder. As he entered, he lifted his hat with something of foreign urbanity, and a profusion of fair brown hair fell partially over a high and commanding forehead. His features were handsome, without being eminently so, and his aspect at once bold and prepossessing."

This first love of the man of genius saves him from the murderous designs of her brutal father; and he retreats with her into a lonely cottage, with the sincere though Quixotic intention of repaying her devotion to him by educating her—writing his own ideas on the blank pages of her mind. How this scheme ends may be readily divined—the whole picture is, perhaps, too much idealized. Shall we now show the reader Ernest's second love? a woman of the world, who has replaced the child of nature—lost to him, but not lost for ever. Her portrait sparkles—but it is one on which allusion and simile—those miniature touches, which would overload and enfeeble a composition simple in its *prima intenzione*—could hardly be too profusely lavished.

"It was a brilliant ball at the Palazzo of the Austrian embassy at Naples: and a crowd of those loungers, whether young or old, who attach themselves to the reigning beauty, was gathered round Madame de St. Ventadour. Generally speaking, there is more caprice than taste in the election of a beauty to the Idalian throne. Nothing disappoints a stranger more than to see for the first time the woman to whom the world has given the golden apple. Yet he usually falls at last into the popular idolatry, and passes with inconceivable rapidity from indignant scepticism into superstitious veneration. In fact, a thousand things besides mere symmetry of feature go to make up the Cytherea of the hour.... tact in society—the charm of manner—a nameless and piquant brilliancy. Where the world find the Graces they proclaim the Venus. Few persons attain pre-eminent celebrity for anything, without some adventitious and extraneous circumstances which have nothing to do with the thing celebrated. Some qualities or some circumstances throw a mysterious or personal charm about them.——'Is Mr. So-and-So really such a genius?'—'Is Mrs. Such-a-One really such a beauty?' you ask incredulously. 'Oh, yes,' is the answer. 'Do you know all *about* him or her? Such a thing is said, or such a thing has happened.' The idol is interesting in itself, and therefore its leading and popular attribute is worshipped.

"Now Madame de St. Ventadour was at this time the beauty of Naples; and though fifty women in the room were handsomer, no one would have dared to say so. Even the women confessed her pre-eminence—for she was the most perfect dresser that even France could exhibit. And to no pretensions do ladies ever concede with so little demur, as those which depend upon that feminine art which all study, and in which few excel. Women never allow beauty in a face that has an odd-looking bonnet above it, nor will they readily allow any one to be ugly whose caps are unexceptionable. Madame de St. Ventadour

had also the magic that results from intuitive high breeding, polished by habit to the utmost. She looked and moved the *grande dame*, as if Nature had been employed by Rank to make her so. She was descended from one of the most illustrious houses of France; had married at sixteen a man of equal birth, but old, dull, and pompous—a caricature rather than a portrait of that great French *noblesse*, now almost, if not wholly extinct. But her virtue was without a blemish—some said from pride, some said from coldness. Her wit was keen and court-like—lively, yet subdued; for her French high breeding was very different from the lethargic and taciturn imperturbability of the English. All silent people can seem conventionally elegant. A groom married a rich lady; he dreaded the ridicule of the guests whom his new rank assembled at the table—an Oxford clergyman gave him this piece of advice, 'Wear a black coat and hold your tongue!' The groom took the hint, and is always considered one of the most gentleman-like fellows in the county. Conversation is the touchstone of the true delicacy and subtle grace which make the ideal of the moral mannerism of a court. And there sate Madame de St. Ventadour.

"The charming St. Ventadour! she had attraction for all! smiles for the silent, badinage for the gay, politics for the Frenchman, poetry for the German—the eloquence of loveliness for all! She was looking her best—the slightest possible tinge of rouge gave a glow to her transparent complexion, and lighted up those large dark sparkling eyes (with a latent softness beneath the sparkle,) seldom seen but in the French—and widely distinct from the unintellectual languish, or the full majestic fierceness of the Italian gaze. Her dress of black velvet, and graceful hat with its princely plume, contrasted the alabaster whiteness of her arms and neck. And what with the eyes, the skin, the rich colouring of the complexion, the rosy lips, and the small ivory teeth, no one would have had the cold hypercriticism to observe, that the chin was too pointed, the mouth too wide, and the nose, so beautiful in the front face, was far from perfect in the profile."

This bright Madame de St. Ventadour also has her day, and her influence; but the hero, we acquit him of inconstancy, is ere long again found roaming the earth—fancy-free, save for old disturbing recollections of the maiden of the cottage. We would give the scene in the 2nd volume, where the latter returns, which reminds us, with a difference, of one of the finest things in modern fiction—the opening of Paul de Kock's 'Frère Jacques;' but having offered specimens of incident and character, let us take a scene of emotion. Ernest becomes a successful author—a high-hearted politician—and finds, at last, for his third love, a bright, gorgeous, scornful woman of genius,—a nobleman's daughter too—rich, and proud—who has fallen in love with the author Maltravers long ere she has seen the man. We dare not trust ourselves with the intrigue by which he loses her, as we cannot dilate on the antagonistic character of Mr. Lumley Ferrers, the man of the world, or describe the vagaries of the wild poet Cesarini, which are drawn with a master hand:—enough, that he loses her by the lingering death of consumption; and that he has registered in his mind a terrible vow of vengeance, against those whose arts and misrepresentations, by sundering them for a time, had paved her way to the grave. The crisis approaches—the *man* is writhing under the agony of his bereavement, and the weight of a stern and consuming purpose, when *the author* is subjected to one of those severe ordeals—strange in their contrast between outward circumstance and inward feeling—which all must, in degree, have experienced, whose lot has led them much before the public. He takes up a newspaper:

"Maltravers' eyes fell mechanically on the columns, and caught his own name. That work which in the fair retirement of Temple Grove it had so pleased him to compose—in every page and every thought of which Florence had been consulted—which was so inseparably associated with her image, and glorified by the light of her kindred genius—was just published. It had been completed long since: but the publisher had, for some excellent reason of the craft, hitherto delayed its appearance. Maltravers knew nothing of its publication—he had meant after his return to town to have sent to forbid its appearance; but his thoughts of late had crushed everything else out of his memory—he had forgotten its existence. And now, in all the pomp and parade of authorship, it was sent into the world! *Now, now*, when it was like an indecent mockery of the Bed of Death—a sacrilege, an impiety! There is a terrible disconnexion between the author and the man—the author's life and the man's life—the eras of visible triumph may be those of the most intolerable, though unrevealed and unconjectured anguish. The book that delighted us to compose may first come to the world in the hour when all things under the sun are joyless. This had been Ernest Maltravers' most favoured work. It had been conceived in a happy hour of great ambition—it had been executed with that desire of truth which in the mind of genius becomes Art. How little, in the solitary hours stolen from sleep, had he thought of self, and that labourer's hire called 'fame;' how had he dreamed that he was promulgating secrets to make his kind better and wiser and truer to the great aims of life! How had Florence, and Florence alone, understood the beatings of his heart in every page! *And now!*—It so chanced that the work was reviewed in the paper he read—it was not only a hostile criticism, it was a personally abusive diatribe, a virulent invective. All the motives that can darken or defile were ascribed to him. All the mean spite of some mean mind was sputtered forth. Had the writer known the awful blow that awaited Maltravers at that time, it is not in man's nature but that he would have shrunk from this petty gall upon the wrung withers; but as I have said, there is a terrible disconnexion between the author and the man. The first is always at our mercy—of the last we know nothing. At such an hour Maltravers could feel none of the contempt that proud—none of the wrath that vain minds feel at these small stings. He could feel nothing but an undefined abhorrence of the world, and of the aims and objects he had pursued so long. Yet that even he did not then feel. He was in a dream; but as men remember dreams, so when he awoke did he loathe his own former aspirations, and sicken at their base rewards. It was the first time since his first year of inexperienced authorship—that abuse had had the power even to vex him for a moment. But here, when the cup was already full, was the drop that overflowed. The great column of his past world was gone, and all else seemed crumbling away."

It is impossible, by fragments such as the foregoing, to give the reader an idea of a work so far out of the common order of fictions as 'Ernest Maltravers.' We therefore recommend him to judge for himself, and, speaking from experience, to read the work deliberately. There is more in its philosophy than meets the eye on a hasty perusal.

List of New Books.—**Affection's Keepsake, for 1838, 32mo. 2s. 6d. silk.—Ernest Maltravers, by E. L. Bulwer, Esq., 3 vols. post 8vo. 31s. 6d. bds.—Johnson's Letters to Brother John on Health, &c., 8vo. 7s. bds.—Lodge's Genealogy of the Peerage, 6th edit. roy. 8vo. 21s. cl.—Lockhart's Life of Scott, Vol. V., post 8vo. 10s. 6d. cl.—The Earldom Restored; an Event in High Life, 2 vols. fc. 15s. bds.—Ethel Churchill, or the Two Brides, 3 vols. post 8vo, 31s. 6d.—A Glance into the Kingdom of Grace, by Dr. Krummacher, Author of 'Elijah the Tishbite,' 12mo. 2s. 6d. cl.—Christian Poetry, 4th edit. 32mo. 2s. cl.—Pastoral Recollections, in Six Letters to a Friend, 18mo. 2s. cl.—Jarius, or the Home Missionary, fc. 3s. 6d. cl.—A Winter at De Courcy Lodge, fc. 3s. 6d. cl.—Smith's Philosophy of Health, Vol. II., 12mo. 7s. cl.—Allison's Guide to English History, 2nd edit. 18mo. 3s. cl.—Stewart's Stories from the History of Scotland, 3rd edit. 18mo. 3s. cl.—Johnson's Life of Sir Edward Coke, Lord Chief Justice in the Reign of James I., 2 vols. 8vo. 28s. bds.—Stories of Spanish Life, edited by Colonel Crawfurd, 2 vols. post 8vo. 21s. bds.**

Meteorological Observations made at the Apartments of the Royal Society, Somerset House, for 37 *successive hours, commencing* 6 A.M. *of the* 21*st of September* 1837, *and ending* 6 P.M. *of the following day.*

(*Greenwich mean time.*)

By Mr. J. D. Roberton, Assistant Secretary, Royal Society.

Hours of Observation.	Barom. corrected. Flint Glass.	Barom. corrected. Crown Glass.	Attach. Ther.	Extern. Ther.	Old Standard Barom.	Attach. Ther.	Difference of Wet & Dry Bulb Ther.	Dew Point.	Rain in Inches.	Wind.	REMARKS.
6, A.M.	29.826	29.818	61.3	54.3	29.911	62.3	02.8	57		NE	Fine—nearly cloudless—light wind.
7, ..	29.838	29.830	61.8	55.4	29.928	62.5	01.2	58		NNE	Hazy—light wind.
8, ..	29.842	29.834	61.9	57.6	29.934	62.6	01.9	57		E	Ditto ditto.
9, ..	29.850	29.842	62.2	59.2	29.942	63.2	02.7	58		NE	Cloudy—light brisk wind.
10, ..	29.866	29.856	63.8	62.2	29.956	64.4	03.0	59		NNE	Fine—light clouds and wind.
11, ..	29.856	29.850	64.4	63.8	29.952	65.3	06.2	59		NE	Fine—nearly cloudless—light wind.
12, ..	29.854	29.848	64.6	65.4	29.954	65.7	07.3	59		ENE	Fine and cloudless—light wind.
1, P.M.	29.854	29.846	64.6	65.8	29.960	66.0	07.1	60		NE	Fine—light clouds and wind.
2, ..	29.860	29.850	64.7	66.2	29.960	66.4	07.2	61		E	Fine—nearly cloudless—light wind.
3, ..	29.866	29.856	64.9	65.6	29.968	66.6	08.2	61		NE	Ditto ditto.
4, ..	29.872	29.864	65.0	64.0	29.978	66.7	06.3	61		NE	Ditto ditto.
5, ..	29.890	29.884	65.0	63.2	29.992	66.6	05.6	60		NE	Ditto ditto.
6, ..	29.908	29.902	64.8	61.2	30.004	66.3	04.2	59		NNE	Ditto ditto.
7, ..	29.928	29.922	64.3	59.3	30.023	65.6	03.0	60		NE	Ditto ditto.
8, ..	29.938	29.932	63.9	58.4	30.033	65.0	03.2	59			Fine and star-light.
9, ..	29.940	29.934	63.7	57.0	30.033	64.5	02.6	57			Ditto ditto.
10, ..	29.952	29.942	63.2	56.2	30.037	64.3	02.0	57			Ditto ditto.
11, ..	29.954	29.942	62.8	55.0	30.039	63.6	01.2	57			Fine—Moon shining with great brilliancy.
12, ..	29.954	29.942	62.6	54.5	30.039	63.3	01.3	58			Ditto ditto.
1, A.M.	29.955	29.947	62.3	53.7	30.039	62.8	00.6	58			Ditto ditto.
2, ..	29.957	29.947	62.0	53.4	30.043	62.7	00.7	56			Ditto ditto.
3, ..	29.957	29.947	61.9	54.4	30.043	62.5	00.7	57			Ditto ditto.
4, ..	29.951	29.943	61.8	54.4	30.041	62.3	00.7	56			Ditto ditto.
5, ..	29.951	29.941	61.7	53.3	30.039	62.2	00.8	57		N	Thick heavy clouds—light wind.
6, ..	29.963	29.955	61.6	54.2	30.051	62.0	01.0	56		N	Overcast—light wind.
7, ..	29.979	29.969	61.5	56.3	30.065	62.2	01.4	57		N	Ditto light mist and wind.
8, ..	29.989	29.981	62.2	58.5	30.081	62.6	02.0	58		NE	Ditto light fog and wind.
9, ..	29.998	29.990	63.0	60.5	30.091	63.7	03.6	58		NE	Cloudy—light brisk wind.
10, ..	30 000	29.994	63.7	61.5	30.097	64.5	02.6	59		NE	Fine—light clouds and wind.
11, ..	29.998	29.990	64.2	62.7	30.093	65.3	05.6	59		NE	Ditto ditto.
12, ..	29.992	29.982	64.4	64.7	30.091	65.8	07.4	58		ENE	Ditto ditto.
1, P.M.	29.980	29.972	64.5	65.2	30.079	66.2	06.8	60		ENE	Ditto ditto.
2, ..	29.974	29.966	64.7	64.7	30.071	66.4	05.8	60		ENE	Ditto ditto.
3, ..	29.976	29.968	64.8	64.2	30.075	66.5	06.6	60		ENE	Ditto ditto.
4, ..	29.974	29.966	64.7	63.4	30.079	66.4	06.0	60		E	Ditto ditto.
5, ..	29.978	29.968	64.5	62.2	30.077	66.2	05.7	59		NE	Fine and cloudless—light wind.
6, ..	29.984	29.974	64.2	60.8	30.085	65.7	05.1	58		NE	Ditto ditto.
	29.930	29.921	63.4	59.8	30.024	64.5	03.8	58.5			

SEVENTH MEETING OF THE BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

[*From our own Correspondents.*]

Continued from p. 707.

SECTION A.—MATHEMATICAL AND PHYSICAL SCIENCE.

THURSDAY, SEPT. 14.

Mr. Lubbock read the Report of the Committee appointed to consider his proposition for the construction of new Empirical Lunar Tables.

The Committee were of opinion that the reduction of a considerable number of lunar observations would be an extremely valuable acquisition to astronomy; particularly all Bradley's, some of Maskelyne's, and all Pond's new transit and circle observations; that one invariable system of reduction should be employed throughout, and skeleton forms should be used as far as practicable. That the places of the moon, so reduced, should then be compared with tables, either expressed, or expressible, in circular functions of multiples of the time, such as those of M. Damoiseau, or considering the number of modern observations that have been compared with Burckhardt's tables, and the recent transformations of his expressions, it may be doubtful whether those of Burckhardt should not be preferred; at all events, this point may be left to the future judgment of whoever may superintend the execution of the work, or, at least, until the observations shall have been reduced.

The following materials exist, applicable to the improvement of the lunar tables:—

1. Observations of Right Ascension and North Polar Declination at Greenwich, from 1750 to the present time, in number, perhaps, about 9,000. Those from 1783 to 1819 were computed and published (in 1821) by order of the Board of Longitude. But this work gives no account of the methods employed; hence the necessity for fresh reductions is not removed.

2. Calculations, of several years past, in the 5th Part of the Greenwich Observations; some compared with Burckhardt's tables. These reductions require re-examination, for some persons consider them as liable to doubt.

3. About 250 observations, made at Cambridge in 1833, 4, and 5, completely reduced; also Cambridge Observations in Right Ascension of 1828-9, 1830, 1831, and 1832, reduced.

In order to execute the comparison of observed and calculated places, tables, containing factors for converting errors of right ascension and declination into those of longitude and latitude, have been printed, in the Appendix to the Greenwich Observations of 1836.

The step which the Committee now recommend, and which must necessarily precede any other, consists in the careful reduction of numerous observations, and in ascertaining the errors of given tabulated expressions, by comparing together calculated and observed places. They consider the execution of this work much to be desired, although the labour would be very great. Still, it must be recollected, that while the observations exist in their present state they remain useless, and that the expense of reducing them would not be disproportionate to the value which they would acquire, or to the exertions of those great astronomers who have handed them down to us in their present comparatively imperfect form.

Sir William Hamilton concurred in the general statements contained in the Report. He was not acquainted with any subject of investigation upon which the funds of the Association might with so much propriety be expended, as upon that brought before the Section in this Report.

Prof. Henry then made a communication respecting the Lateral Discharge in common Electricity.

The primary object of these investigations was to detect, if possible, an inductive action in common electricity, analogous to that discovered in a current of galvanism. For this purpose an analysis was instituted, of the phænomena known in ordinary electricity by the name of the lateral discharge. Prof. Henry was induced to commence with this from some remarks by Dr. Roget on the subject. The method of studying the lateral spark consisted in catching it on the knob of a small Leyden phial, and presenting this to an electrometer. The result of the analysis was in accordance with an opinion of Biot, that the lateral discharge is due only to the escape of the small quantity of redundant electricity which always exists on one or the other side of a jar, and not to the whole discharge. The Professor then stated several consequences which would flow from this; namely, that we could increase or diminish the lateral action, by the several means which would affect the quantity of redundant, or as it may be called, free electricity, such as an increase of the thickness of the glass, or by substituting for the small knob of the jar a large ball. But the arrangement which produces the greatest effect, is that of a long fine copper wire insulated, parallel to the horizon, and terminated at each end by a small ball. When sparks are thrown on this from a globe of about a foot in diameter, the wire, at each discharge, becomes beautifully luminous from one end to the other, even if it be a hundred feet long: rays are given off on all sides perpendicular to the axis of the wire. In this arrangement the electricity of the globe may be considered nearly all as free electricity; and as the insulated wire contains its natural quantity, the whole spark is thrown off in the form of a lateral discharge. But to explain this phænomenon more fully, Prof. Henry remarked, that it appeared necessary to add an additional postulate to our theory of the principle of electricity,—namely, a kind of momentum, or inertia, without weight; by this he would only be understood to express the classification or generalization of a number of facts, which would otherwise be insulated. To illustrate this, he stated that the same quantity of electricity could be made to remain on the wire if gradually communicated; but when thrown on in the form of a spark, it is dissipated as before described. Other facts of the same kind were mentioned; and, also, that we could take advantage of the principle to produce a greater effect in the decomposition of water by ordinary electricity. The fact of a wire becoming luminous by a spark, was noticed by the celebrated Van Marum more than fifty years ago, but he ascribed it to the immense power of the great Haarlem machine. The effect, however, can be produced, as before described, by a cylinder of Nairn's construction, of seven inches in diameter, a globe of a foot in diameter being placed in connexion with the prime conductor to increase its capacity.

Some experiments were next described, in reference to the induction of the lateral action of different discharges on each other. When the long wire is arranged in two parallel, but continuous lines, by bending the wire, the outer side of each wire only becomes luminous; when formed into three parallel lines by a double bend, the middle portion of the wire does not become luminous, the outer sides only of the outer lines of wire exhibit the rays. When the wire is formed into a flat spiral, the outer spiral alone exhibits the lateral discharge, but the light in this case is very brilliant; the inner spirals appear to increase the effect by induction.

Prof. Henry then stated, that a metallic conductor, intimately connected with the earth at one end, does not silently conduct the electricity, thrown in sparks, on the other end. In one experiment described, a copper wire, 1-8th of an inch in diameter, was plunged at its lower end into the water of a deep well, so as to form as perfect a connexion with the earth as possible; a small ball being attached to the upper end, and sparks passed on to this from the globe before mentioned, a lateral spark could be drawn from any part of the wire, and a pistol of Volta fired, even near the surface of the water. This effect was rendered still more striking, by attaching a ball to the middle of the perpendicular part of a lightning rod, put up according to the directions given by Gay-Lussac, when sparks of about an inch and a half in length were thrown on the ball; corresponding lateral sparks could be drawn not only from the parts of the rod between the ground and the ball, but, from the part above, even to the top of the rod. Some remarks were then made on the theory of thunder-storms, as given by the French writers, in which the cloud is considered as analogous in action to one coating of a charged glass, the earth the other coating, and the air between as the non-conducting glass. One very material circumstance has been overlooked in this theory,—namely, the great thickness of the intervening stratum, and the consequent great quantity of free or redundant electricity in the cloud. This must modify the nature of the discharge from the thunder-cloud, and lead to doubt, if it be perfectly analogous to the discharge from an ordinary Leyden jar, since the great quantity of redundant electricity must produce a comparatively greater lateral action; and hence, possibly, the ramifications of the flash, and other similar phænomena, may be but cases of the lateral discharge.

Some facts were then mentioned, on the phænomena of the spark from a long wire charged with common or atmospheric electricity. It is well known that the spark in this case is very pungent, resembling a shock from a Leyden jar. The effect does not appear to be produced, as is generally supposed, by the high intensity of the electricity at the ends of the wire by mere distribution, since this is incompatible with the shortness of the spark. In one experiment, fifteen persons joining hands received a severe shock, while standing on the grass, from a long wire, one of the number only touched the conductor; the spark in this case was not more than a quarter of an inch long. Several other analogous facts were mentioned, and the suggestion made, that the whole were probably the result of an inductive action in the long wire, similar to that observed in a long galvanic current: the subject now required further investigation.

Professor Henry concluded by observing, that the facts he had given in this communication were such as must have been noticed by every person who is in the habit of experimenting on ordinary electricity, but he believed these had never been studied in this connexion. He was happy to direct the attention of the Section to the subject, as one which appeared to afford an interesting field of research, particularly in connexion with the recent discoveries of the surprising inductive actions of galvanic currents.

Mr. Stevelly admitted, that to him most of the facts were new, and seemed to give a distant glimpse of establishing on a more solid basis than had as yet been done, the connexion between common electricity and galvanic currents. It also seemed to furnish a clue to the explanation of accidents which had been known to occur to buildings protected by lightning rods on the most approved construction, since we know that the lateral discharge frequently takes place in thunder-storms; and if it were in any case to be thrown upon the conductor, the effects described by Mr. Henry must follow. He regretted that Mr. Snow Harris had not been present to hear the early part of the communication.—Mr. Abram corroborated the views of Professor Henry, and stated some circumstances connected with the inductive influence of currents of galvanic electricity which appeared to him analogous.—Mr. Holden felt convinced that the lateral discharge was nothing more than a case of common induction.—Professor Henry observed that he had previously stated his conviction that it was so.—Mr. Sturgeon was confident a well-constructed thunder rod would never be struck by lightning, as, upon the approach of an electrical cloud, it would silently discharge it into the earth.—Mr. Stevelly said that unquestionably when the discharge was made directly upon the thunder rod, if well constructed, it would perform its office silently; but if a lateral discharge took place near it, the effect, as Professor Henry showed, might be flashes of light and heat from the entire length of it, capable, when on a great scale, of setting fire to buildings, firing gunpowder, and other effects hitherto unexpected.—Mr. Snow Harris expressed his regret that he had not been in the room during the early part of Professor Henry's communication. In his opinion the pressure of the air was an element in the phænomena not sufficiently attended to. He had produced beautiful illuminating effects by discharging electricity along a wire enclosed in an exhausted glass receiver. It was not, he believed, publicly known that even a glass rod, or rods of other non-conducting substances, became excellent conductors when placed in vacuo.—Mr. Ettrick said he had observed the illuminating effects spoken of by Mr. Harris when he used a leaden wire.—Mr. Addams confirmed the statements made by Professor Henry as to the illuminating effects of the lateral discharge; he had once seen upon the discharge of a large electrical battery, a wire

splendidly illuminated by the lateral discharge, and exhibiting the coruscations spoken of by Professor Henry.

Sir David Brewster then read his paper on 'The cause of the Optical Phænomena which take place in the Crystalline Lens during the absorption of Distilled Water.'—Sir David Brewster commenced by drawing the attention of the Section to a drawing of the eye of the sheep. The several parts of the drawing under consideration were most carefully laid down on one scale, and the exact measurements given, respecting the cornea in particular. It appeared that it was a portion of an ellipsoid, somewhat longer but not so deep as the ball of the eye, the cornea being a portion of its most convex part about the major axis. Sir David then went on to introduce the subject of the present communication by briefly running through the leading points to which he had adverted at the last meeting of the Association, regarding a series of experiments on the crystalline lenses of quadrupeds. From these it appeared that the capsule of the lens absorbs water with great avidity; and during this process exhibits (when exposed to the analysis of polarized light) remarkable changes both in the nature and in the number of the positive and negative doubly refracting structures of which it is composed. These singular, and, in the case of the lens of the horse, very beautiful phænomena, Sir David stated that he was not able to explain when he first made the communication, but he had since returned to the subject, and had succeeded in discovering the cause of the various phænomena which he had observed. While the capsule of the lens is absorbing distilled water, its bulk is gradually increasing, and consequently this membrane, which he found to be highly elastic, became more and more stretched in the direction of the radii of its circular margin. This extension produces, as may be shown by direct experiment, a negative doubly refracting structure, like the central portion of a positive system of polarized rings, with a rectangular black cross. The tint of this membrane rises to a *white* of the first order, and, as it is double, the two tints will produce, when combined, a *purple* of the first order, which will be the maximum tint developed by the extended capsule just before it bursts. Now it is obvious that the optical figure thus given by the capsule alone will, when combined with the fixed optical figure of the lens itself, produce all the variable phænomena previously observed. If the fixed optical figure consist of two structures, both positive, then one part of the capsule will produce, in the neutral black ring, a negative doubly refracting luminous ring, which separates the two positive luminous rings; while the outer and inner portions of the capsule will act in opposition to the positive structures of the lens, and tend to diminish or obliterate the tints produced at these parts. The result of this combination of actions will be the production of a certain optical figure, in which a negative series of luminous sectors is placed between two positive series of luminous sectors. In the process by which these changes are produced, a new series of luminous sectors, having negative double refraction, has been made to appear in the centre of the neutral black ring. The inner portion of this black ring has been made to advance inwards, and diminish the size as well as the intensity of the inner or central series of sectors, while the outer portion of the same black ring has encroached in a similar manner upon the outer series of positive sectors, and reduces it both in its size and in the intensity of its illumination. If the original optical figure of the lens consist of one positive structure, or of three structures, the middle one of which is *negative* and the two others *positive*, the changes which they undergo by the absorption of water, and the consequent extension of the membranous capsule are explicable in the same manner; and not only the character but the numerical value of all the tints which are successively generated can be calculated with the greatest accuracy by assuming a value of the tint produced by each surface of the capsule. In order to remove all ambiguity on the subject, Sir David Brewster extended the capsule of the lens of a sheep over a plate of glass, and by a slight force he readily produced a white of the first order, and of the same numerical value as that which is necessary to produce the phænomena in question. In order to obtain a direct experimental confirmation of these views we have only to take a circular plate of glass which produces, either by rapid cooling or by the transit of heat, a series of luminous sectors of the same value as that which is produced by the capsule; and, by combining it with the optical figure of the lens we represent all the phænomena exhibited by the lens, when its capsule is expanded by the absorption of water. From the property of the capsule of the lens by which it absorbs water, it is obvious that in certain states of eye it may become so distended with that fluid that it may at length burst, thus giving rise to the disease which has been termed soft cataract; in this case the obvious remedy is to puncture the outer coating of the eye, and thus permit the vicious fluid to escape, and afford a chance to the vessels of resuming their healthy functions. On the other hand, when the defect of the more watery secretions of the eye cuts off the supply, which it would seem that the capsule is intended to furnish to the lens, an opposite course may be requisite, and a supply of water may be injected into the eye: this has actually been done, although when Sir David mentioned the matter in the Medical Section at the last meeting of the Association, Dr. Macartney stated very strongly his doubts of the possibility of such an operation. Thus, it is probable that optical science may have led to an examination of the nature of the membranes of this valuable organ, and most probably that examination will issue in the proper treatment of a most distressing disease, in each of the distinct forms which it is found to assume.

Dr. Reade next proceeded to explain his method of producing a permanent soap bubble for the exhibition of Newton's rings.

He exhibited to the Section several phials, about one quarter full of a solution of Castile soap in about two ounces of water. Upon giving these a gentle revolving motion, when turned upon their sides, a film was formed like a diaphragm across the phial, which speedily began to show the most splendid bands of colours. He explained, that the permanency of these films,—which were, in effect, portions of soap bubbles,—depended upon their being relieved from the pressure of the atmosphere, by immersing the phials in boiling water, and, as soon as the vapour generated within them had expelled the atmospheric air, corking them closely: as the contents of the phial cool, the pressure or elastic force of the vapour diminishes, and the films might be produced as seen.

Sir W. Hamilton said, that the simple and beautiful experiment which they had just seen, forcibly recalled to his recollection the words of Sir John Herschel—"To blow a large regular and durable soap bubble, may become the serious and praiseworthy endeavour of a sage, while children stand round and scoff; or children of a larger growth hold up their hands in astonishment at such waste of time and trouble."

Professor Christie then made a communication 'On the Occurrence of the Aurora Borealis in Summer.'

The occurrence of an aurora borealis in England, in the middle of summer, was, he believed, a phænomenon hitherto unrecorded. He then gave an account of several very striking exhibitions of this phænomenon, which he had observed during the last summer. One, on the 19th of May, 1837, presenting two bands of arches, radiating from the magnetic west, and extending nearly to the opposite horizon, was unaccompanied by streamers. Another, on the 24th June, exhibited the usual appearance of coruscation from the northern horizon, but no arches were visible. This aurora, which was the most singular from being observed in the very middle of summer, lasted from 11h. 46m. until 12h. 20m. P.M. Other auroras were observed on the 1st, 2nd ,and 7th of July, and 25th of August. On the last occasion, the author noticed a singular phænomenon, which he had, on one occasion, many years previous, observed, namely, that the darkness usually attending an aurora appeared to break into the light above it. He noticed that, on the former occasion, he observed the darkness to rush through, and finally break up, two well-defined arches of white light; and recalled to the Section, that Captain Back had described a very striking exhibition of a similar phænomenon, which he witnessed during his wintering at Fort Reliance. He particularly called attention to these and other phænomena, of the darkness exhibited in the aurora borealis, in connexion with the arches of light and the more brilliant coruscations. After recurring to other auroras which he had observed during the last summer, he inferred that it was probable that the aurora borealis was as frequently in activity in summer as during other seasons, though it might be less frequently visible. The author further stated, that during the last twelve months, no period of a month had elapsed without the exhibition, in the south of England, of one or more auroras; and pointed out the importance of inquiring into the cause of the now so frequent occurrence of a phænomenon, which some years back had been very rare. He concluded by expressing a hope that observations of the highly-interesting phænomena of the aurora would be entered upon by members of the British Association, who might have more time at their command than his own avocations allowed him for such observations.

Mr. Stevelly stated, that the dark cloudy appearance during the aurora was so characteristic, that on one or two occasions, having seen, just before sunset, these scattered black clouds, he was led to anticipate that an aurora would ensue, which accordingly manifested itself when it grew dark; and a friend, since he came to Liverpool, had boasted that he could unfailingly predict an aurora on the evening of the night on which it was to occur. He had mentioned this to Professor Christie, who said that his own experience had been precisely similar.—Sir David Brewster said, that, by an analysis of the light of the aurora borealis, he had proved that it was direct light, and had never suffered either reflection or refraction.—Sir W. Hamilton inquired whether Mr. Christie had taken any notice of the very remarkable aurora which occurred on the 18th of last February,—Professor Christie said he had observed it. The object, however, of his present communication, was to turn attention to the occurrence of the aurora in summer.—Mr. Snow Harris trusted that a wide line of distinction would be drawn between electrified luminous clouds and the true aurora. He also wished attention to be turned to the difference between magnetic needles when suspended in vacuo and in the open air. He had exhausted a very tall glass receiver, and by electrifying it, caused a very brilliant display resembling the aurora. This notably affected a needle suspended near it in the open air; but a needle suspended in vacuo was not at all affected.—Mr. Abram had no doubt whatever but that the aurora was a magneto-electrical effect; and described an apparatus which he had contrived in order to illustrate this.

Mr. W. Snow Harris made a report 'On the Hourly Observations of the Thermometer, Barometer, and Wet Bulb Thermometer.' Since his last report on the two years' Hourly Observations of the Thermometer, made on behalf of the Association at Plymouth, he had the pleasure of being able to say, that the register is now complete for a period of five years, hourly, without any intermission; the observations taken by a few careful persons, who have been, as it were, regularly drilled for the service. The observations were not completed in time to admit of his presenting to the Section a detailed report of results, which he hoped, however, to do at the next meeting. He must therefore content himself with a few very brief observations. First, that the mean temperature of the five years differs only about four-tenths of a degree from that deduced from the two years' observations already given in the Report of the Association. The mean temperature of the two years, from 17,520 observations, being 52.90; that of the five years, from 43,800 observations, being 52.45. The mean temperature of the monthly and other periods undergoes analogous small changes. It appears, as in the case of the years, the hourly temperature of which were taken at Leith Fort, and the results of which have been given by Sir D. Brewster, in his paper in the Edinburgh Philosophical Transactions, that two years warmer than usual had been taken. The five years, however, now discussed, effectually correct small discrepancies arising from this source of error; and he had little doubt that we have now, from observation, if not the precise mean temperature of Plymouth, a very close approximation to it. But he hoped to present the Association with a very complete detail of these results at their next meeting.

He had to report to the Section, that, in addition to this first set of hourly observations contemplated by the Association, they had most auspiciously commenced an hourly register of the barometer, thermometer, and wet bulb thermometer, with a view of investigating a variety of other phænomena, which are of the highest interest to the science of meteorology. When we take into account (said Mr. Harris) the circumstance that we have at Plymouth the state of tides observed and registered with extreme care; that one of Mr. Whewell's anemometers is also in operation, under the direction of Mr. Southwood, of Devonport, who has devoted much attention to the subject,—we may congratulate ourselves on having at length arrived at a systematic and accurate series of meteorological observations, calculated to throw great light on the laws of atmospheric changes.

The register of the barometer, thermometer, and wet bulb thermometer, for which the Association placed in his hands, last year, the sum of 30*l.*, is complete, and reduced for six months—a period too short for deducing general results. Mr. Harris had, however, for the satisfaction of the Section, thought it requisite to place before them the register for this period, with a view of showing the progress hitherto made. The register is complete from the 1st of January, 1837. He looked forward to have the honour of laying, on a future occasion, the results in detail before the Section.

Professor Lloyd stated, that he was happy to inform the Section that a similarly extensive series of connected observations were in contemplation by the Engineers employed in the Trigonometrical Survey of Ireland.

Mr. Southwood followed with 'An Account of his Observations with Mr. Whewell's anemometer at Plymouth.'

Mr. Southwood spoke first of the successive imperfections in the original construction of the instrument, which only forced themselves upon his attention as the evils which arose from them presented themselves to him in the practical working of the machine. He pointed out the remedies which he had adopted. The most important were, the use of the successive letters of the alphabet, A, B, C, &c. to mark the successive points to which the wind shifted in the register;—a ready means of unclamping the nut carrying the pencil, (which descends 1-20th of an inch for ten thousand revolutions of the fly,) as soon as it has reached the bottom, and replacing it at the top;—also ready means of placing a new fly on the axle when any accident occurs to the one which had been there;—a means of protecting the parts most liable to injury from wet;—and various other points, which his attention to the performance of the machine had made him perceive the importance of.

Mr. Whewell said, that doubtless, as the machine became used, it was to be expected that many imperfections, which could not at first have been known, would present themselves; and he felt particularly happy that a gentleman so competent to the task as Mr. Southwood had applied himself to the practical working of the machine and its improvement. Some of those suggested by Mr. Southwood had already been adopted, the necessity for them having appeared during the progress of the observations made at Cambridge. The greatest difficulty, he anticipated, would arise in the comparison of the results obtained by different machines, for unquestionably the unit of force for each seemed to be different, and it was all but impossible, in the construction of them, to make any two with precisely the same unit. The only remedy for this would appear to be the comparison of the results obtained from two machines, placed near one another, and under precisely similar circumstances; or a similar comparison of all with one common standard. He then proceeded to show how, by a simple application of the composition of forces, the entire force or integral effect of the wind could be had for any assigned period, in any assigned direction.—Mr. Snow Harris asked how the instrument showed the actual force of the wind at any one hour?—Mr. Whewell replied, that it was not the object of the machine to show the force of the wind at any one moment, but to sum the forces or effects which it exhibited for an assigned period: hence no clock was attached to the machine.

Sir David Brewster then gave an account of a new property of light discovered by him. He observed, that his attention had lately been drawn to a very curious, and, to him, entirely inexplicable property of light. While examining the solar spectrum formed in the focus of an achromatic telescope, after the manner of Frauenhofer, he placed a thin plate of glass before his eye, in such a manner as to intercept and retard one half of the pencil, which was entering his eye, by placing it before one half of the pupil. He was then surprised to find, that when the edge of the retarding glass plate was turned towards the red end of the spectrum, intensely black lines made their appearance, as might be expected, at such regular intervals, as to represent the most exact micrometrical arrangement of wires; but upon turning the plate of glass half round, (still keeping its plane perpendicular to the axis of the eye,) so as to present the edge, past which the rays entered the eye, to the violet end of the spectrum, every one of those dark bands entirely disappeared. In the intermediate positions of that edge they appeared more or less distinct, according as the edge was more presented to the red, or to the violet, end of the spectrum. A glass plate, one-thirtieth of an inch thick, gave these lines; but the thinner the glass, the more intense was the blackness, and the more distinct the lines. They were formed in any part of the spectrum; but they were best seen when the rays were intercepted which lay between the two fixed lines A and D of Frauenhofer. An examination of these lines afforded the very best means of determining the dispersive powers of substances, for their distance from one another increases or diminishes, exactly as the entire length of the spectrum is increased or diminished; and the number of them in the same part of two spectra is always the same.

Mr. Whewell did not see how any new property of light was involved in these phænomena; for it was to be expected, that when some of the rays were retarded in passing through the glass plate, they would interfere with those not passing through, and give rise to such fringes as had been described.—Mr. Stevelly said, perhaps Mr. Whewell had not been in the Section during the early part of Sir David Brewster's explanation. The inexplicable part of the experiment was, that the black fringes were formed when the edge of the retarding plate was turned one way, or towards the red end of the spectrum, but were not formed when that edge was turned the other way, or towards the violet end; whereas, in either case, the conditions heretofore thought to be essential for the formation of fringes, were identically the same.—Mr. Whewell said, that he had heard the entire of Sir David Brewster's explanation, and fully understood the phænomena as described, but was still dissatisfied with the conclusion that any new property of light was involved. He felt convinced that no such bands would be seen in perfectly homogeneous light.—Sir David Brewster said, that, in one respect, Mr. Whewell was perfectly right. If a portion of the light of the spectrum were first collected into a focus by means of a lens, and then viewed with the retarding plate interposed, no fringes would appear; but then it was to be observed, that, in that case, rays from the red and from the violet end of the portion of the spectrum used, would be so intermixed, that, in any one position of the retarding plate, its edge might just as well be considered as presented to the violet end of the spectrum as to the red.—Professor Lloyd was almost tempted to express a hope, that the very inexplicable property of light now described by Sir David Brewster, would not compel us to adopt the conclusion, that the time of an undulation of light could, under certain circumstances, be altered. He could not, at present, guess at any other probable way of explaining this fact.

Professor Lloyd now laid before the Section a Map of the curve of Diurnal Magnetic Variation for the twenty-four hours, commencing at noon (Göttingen time), on the 31st of August last.

Mr. Lloyd said, that it was well known to many members of the Section, that an announcement had appeared, not long since, in some of the foreign journals, stating that M. Parrot had undertaken a scientific expedition to the North Cape,—the principal object of which (he believed) was to obtain further information on the subject of those simultaneous changes in the direction of the horizontal needle, which have been brought to light by the system of combined observation, carried on under the direction of M. Gauss. This announcement was accompanied by an invitation from Baron Humboldt, calling on observers to engage in corresponding observations of the horizontal needle on stated days; and the 31st of August being one of these days, Mr. Lloyd undertook, with the assistance of two other observers, to make such a series of observations on that day.

The apparatus employed was the beautiful and well-known apparatus of Professor Gauss. The needle was observed every five minutes during 24 hours; and the results of observations were laid down in curves. Of course no conclusion can be drawn from these observations, until the corresponding observations taken by other observers shall have been made public. The present observations show that a remarkable disturbance of the needle took place between 9 and 11, P.M. (Göttingen time). At 9h. 10m. the north end of the needle began to move rapidly to the eastward, and reached its maximum of easterly direction at 9h. 30m. It then returned as rapidly to the west, and at 9h. 50m. reached its greatest elongation westward. After this it made a second great oscillation, reaching its extreme of easterly position at 10h. 30m., and then returning (but not so rapidly, nor so far) to the westward. In the course of these sudden changes, the needle moved through more than 20 minutes of space in 20 minutes of time.

Mr. Peacock called the attention of the Section to the diagrams descriptive of the variations of the needle at their several stations, at the same absolute moments of time, and requested that they would notice the exact conformity of them; insomuch that each would almost identically coincide with the rest, if they were laid together.

Captain Denham then made a communication respecting Lighthouses.—The windows of the Section room were on this occasion closed up with green baize screens, and Captain Denham exhibited a parabolic mirror, such as is used in lighthouses, with its lamp lighted. He stated, that one of the modes at present used for distinguishing one lighthouse from another, when a ship was making the coast, was by giving a colour to the light. This, as at present practised, was done by placing a screen of glass coloured red before the aperture of the reflector: he accordingly interposed a screen such as was used, which obviously had the effect of very sensibly diminishing the intensity of the light. He then exhibited his proposed improvement, which was, to surround the flame with a coloured glass globe, or, what he conceived better, to have muffs of glass, stained red, placed upon the lamp. The light, when this latter was placed on, was scarcely less intense than when it was off;—and the Captain said, that the convenience of trimming the lamp, and replacing the muff, was much greater than that experienced when the screen was used. He then explained the precautions required when first the muff was placed on the lamp, to secure it against flying, in consequence of sudden change of temperature; and, in conclusion, he called on Dr. Faraday, who was sitting beside the President, to say whether he did not consider his muff a decided improvement.

Sir David Brewster begged leave to ask Captain Denham, whether the screen he had placed before the mirror was of exactly the same materials, and the same thickness, as the muff?—Captain Denham said they were not.—Then, (said Sir David,) I must take leave to say, that the present experiment is quite inconclusive; and, besides, Captain Denham must know, that different kinds of light were very differently obstructed in passing through atmospheric air; and therefore, one of two lights which, within the compass of a room, might be far more brilliant than another, might yet, in the compass of a very few miles, be so much more diminished in passing through the air, as to be unseen, when the other still retained much of its original brilliancy unimpaired. Red is the light least diminished in passing through air; orange is very much more diminished.—Dr. Faraday begged to say, since he had been so directly appealed to, that he was not at all at issue with Captain Denham, respecting the relative convenience of the two methods; but he did distinctly say, that all the known principles of optical science would be useless, if Captain Denham's method could afford any more light than when a screen was placed before the re-

flector, supposing the materials of both to be the same.—Sir D. Brewster said, that as to convenience, it was to be remarked, that the very precautions Captain Denham had shown to be requisite, in putting on the muffs, proved how liable they were to be broken. Now, an accident of that kind occurring during the night, would essentially change the character of the light, and might be attended with the most serious consequences to the sailor ignorant of that change. —Capt. Denham replied, that the screen was just as liable to be broken by the heat, and much more by accident; and if this occurred, the character of the light would be as essentially changed in the one case as in the other; but in the case of the muff, the danger was rather less, for it generally only cracked, and did not fly entirely to pieces.—Mr. Peacock said, he fully agreed with Sir David Brewster and Dr. Faraday, as to the scientific bearing of this question. The known principles of optics would unquestionably lead to the conclusion, that a muff or a screen, if made of precisely the same materials, should have the same effect upon the light.

Section B.—CHEMISTRY AND MINERALOGY.

THURSDAY.

Doctor Thomas Thomson read a report 'On the Comparative Composition of Cast Iron prepared with the hot and the cold blast.'

Dr. Thomson observed, that the specimens of cast iron examined were all from iron smelted from the iron-stone in the Glasgow coal-field. This iron-stone is a carbonate of iron, more or less pure. The richest is known by the name of *Mushet's black band*, which occurs in the neighbourhood of Airdrie; its specific gravity is 3.0553, and it is composed of

Carbonate of iron	85.44
—— of lime	5.94
—— of magnesia	3.71
Silica	1.40
Alumina	0.63
Peroxide of iron	0.23
Coal	3.03
	100.38

In the poorest specimens of iron-stone the carbonate of iron amounts to only 29 per cent., but such specimens are rejected by the iron-masters. The ore is roasted, to drive off the carbonic acid; this, at an average, reduces the weight about 31 per cent.; it is then mixed with limestone and coal, and smelted.

When the Clyde iron-works were established, above forty years ago, ten tons of coal were requisite to produce one ton of iron. This coal was previously coked, by which rather more than half its weight was driven off under the form of gas, &c. By various improvements the quantity of coal requisite was diminished from ten tons to seven tons thirteen cwt., and the quantity of limestone requisite for smelting one ton of iron was ten and a half cwt. When hot air (or air heated to above 607°,) was blown into the furnace instead of cold air, it was found that coal could be used without being coked, and the quantity requisite to smelt a ton of iron was reduced to two tons nineteen cwt.; the lime was reduced to seven cwt., and the produce of iron in a given time from a furnace was more than doubled. The reason of this superiority of hot air over cold seems to be, that when the hot air enters the furnace it is immediately united to the coal, and is all consumed; whereas, the cold air partly passes up through the materials, and produces, as it ascends, a scattered and useless combustion. Hence, when hot air is introduced, the heat at the point of combustion is greater than when cold air is used. Hence, the smaller quantity of limestone requisite, and the greater produce in iron in a given time. The specific gravity of cold blast iron is lower than that of hot blast. The average of the former being 6.7034, and that of the latter 7.0623.

The following table shows the composition of six specimens of cold blast iron from different localities:—

	Muirkirk.	Do.	Do.	Pyrites.	Carron.	Clyde.	Mean.
Iron	90.98	90.29	91.38	89.442	94.010	90.824	91.154
Copper				0.288			
Manganese		7.14	2.00		0.626	2.458	2.037
Sulphur						0.045	
Carbon	7.40	1.706	4.88	3.600	3.086	2.456	3.855
Silicon	0.46	0.830	1.10	3.220	1.006	0.450	1.177
Aluminum	0.48	0.016		3.776	1.022	4.602	1.651
Calcium		0.018	0.20				
Magnesium						0.340	

The constant constituents were iron, carbon, silicon, and aluminum; and manganese was a pretty frequent ingredient. The average proportions were

3¼ atoms of iron and manganese
1 —— of carbon, silicon, and aluminum.

The atomic proportions of the carbon, silicon, and aluminum, were 4, 1, 1, so that cold blast cast iron may be considered as composed of

21 atoms iron and manganese
4 —— carbon
1 —— silicon
1 —— aluminum.

The following table exhibits the composition of hot blast cast iron, No. 1:—

	Clyde.	Carron	Carron.	Clyde.	Clyde.	Mean
Iron	97.096	93.422	96.09	94.966	94.345	95.56
Manganese	0.332	0.336	0.41	0.160	3.120	0.87
Carbon	2.460	2.400	2.48	1.560	1.416	2.099
Silicon	0.280	1.620	1.49	1.322	0.520	1.086
Aluminum	0.383	0.483	0.26	1.374	0.599	0.422
Magnesium				0.792		

These constituents are in the proportion of

6½ atoms iron and manganese
1 —— carbon, silicon, and aluminum.

In the cold blast we have

Iron.		Carbon, &c.
3¼ atoms	+	1 atom

In the hot blast

6½ atoms	+	1 atom

Thus, it appears, that hot blast iron contains only about half the foreign matter that exists in cold blast iron.

Cast steel made from the best Dannemora iron, had a specific gravity of 7.8125. Its constituents were

Iron	99.283
Manganese	0.190
Carbon	0.383
	99.866

or it contained

55.7 atoms iron
1 atom carbon.

In reply to questions, Dr. Thomson stated, that he had made no experiments on the comparative composition of bar iron from pigs made with the cold and hot blast, and that he had not found any phosphorus in the specimens of cast iron whose analysis he had detailed.—Mr. Tennant stated, that the bar iron by the hot blast was equally tough, both hot and cold.—Mr. Guest inquired of Mr. Tennant, whether in the puddling, hot blast iron did not lose more than the cold blast iron: but to this no satisfactory answer was given.—Dr. Clarke contended, that as the impurities of cold blast iron are about double those of hot blast iron, it was impossible that, as suggested by Mr. Guest, this latter should undergo a greater waste in the process of refining. If such should be proved, he would consider it a chemical miracle. In continuation, Dr. Clarke observed, that manufacturers were too much in the habit of working by what he called the Rule of Thumb, and that, in particular, as the difference of the quantity of pig iron depended materially upon the heat employed, by not attending to this essential condition, iron-masters were liable to fall into erroneous conclusions as to the value of any particular improvement. Mr. Guest being called on by the President to speak to this point, stated distinctly, that he found the hot blast iron to lose more in puddling than the cold; and he had the impression that it was of inferior quality.—Dr. Thomson asked, whether the iron referred to by Mr. Guest was, or was not, made from cinder; to which Mr. Guest replied, that in some cases it was, but that his observation in reference to the greater loss experienced by hot blast iron in the refining surface was applicable to varieties in the manufacture of which cinder was not employed.—Professor Johnston expressed his surprise at the absence of phosphoric acid from the Glasgow iron, the more especially as in the Newcastle coal-field phosphoric acid is abundant, and the nodules of clay iron-stone, which may be considered as coprolites, always, as is well known, include phosphoric acid. He also stated, that as specimens of hot and cold iron have frequently the same physical properties, it is very difficult to pronounce upon the relative value of these processes. The white and black cast iron also may have the very same composition, and therefore the quality of iron must be referred to something totally extraneous to chemical constitution. In fact, quick or slow cooling will determine the pig to be of the one or the other colour.—The President observed, that though, generally speaking, black iron may be considered as yielding the best malleable iron, this could not, with any probability, be predicated of black cast iron got by the rapid cooling of the white variety, as suggested by Professor Johnston.—Dr. Thomson stated, that cinder is a mixture of silicates of iron; and subsequently expressed his conviction, that the quality of iron, notwithstanding what had been alleged to the contrary, is chiefly dependent on its composition, and that if phosphorus, for example, or sulphur, were present, the metal could not be good. The same gentleman, in conclusion, decried the doctrine, which would place what was called the Rule of Thumb above what he considered a much more valuable guide—the Rule of Science.

Dr. Traill then read a paper 'On an Antimonial Compound applicable as a Pigment.'

It is made by adding a solution of ferrocyanide of potassium, to what he denominated the muriate of antimony, (we presume a solution of the sesquichloride of antimony in muriatic acid). The precipitate, which is of an ultramarine colour, he considers to be composed of prussic acid, iron, and oxide of antimony.

Dr. Apjohn stated, that he had no doubt it was a mixture of Prussian blue and the pulvis Algarotti.

Dr. Arnott read a communication 'On an Improved Safety Lamp for Coal Mines.'

He commenced by observing on the frequent explosions which have occurred even with Davy's lamp, on the loss of light by the wire gauze, and with some allusions to the different attempts which have been made to improve the original apparatus as devised by Davy. The principle of his own suggestion was, that the external air should be forced into the mine by the engine used for its ventilation, and that the pipes conveying the air should terminate in the lantern, which should be one of the ordinary kind, furnished with a chimney containing a valve opening outwards. He also explained how the principle might be applied to moveable as well as fixed lights.

Mr. Ettrick made a few remarks upon Dr. Arnott's suggestion, expressive of his doubts as to its possibility and utility.

Mr. Pearsall brought under consideration, the action of water upon lead. He commenced by a reference to the researches of Colonel Yorke and Professor Christison, which demonstrate the corrosion of pure lead by water, though saline water does not dissolve it. (This fact was first noticed by Guyton Morveau.) The great object of his communication was to show, that rain water collected in leaden cisterns will dissolve the metal in considerable quantity, probably as hydrated oxide, but that, if such water be passed through a filter, or agitated with carbonaceous matter, it is altogether removed. This point he established in the course of some investigations having a reference to certain disastrous cases of poisoning which have occurred recently at Hull.

Mr. Mallet stated, that, according to his experience, lead alone is corroded which contains copper. This opinion was combated on the ground, that all the lead of commerce includes copper.—Colonel Yorke also stated, on the other hand, that he had established that perfecly pure lead is corroded by water when it contains air; that the calx is of a crystalline nature, and composed, according to his experiments, of carbonate united to oxide of lead.—A gentleman, whose name we could not learn, stated, that the following experiment was instituted some years ago, and is still in progress. Into three bottles, filled, the first with Thames water, the second with distilled water containing air, and the third, with distilled water deprived of air, three slips of lead were introduced, and the bottles hermetically sealed. The lead in the first has been acted upon; that in the second has been still more extensively corroded; but that in the third continues perfectly bright. The oxidation of the lead is therefore, he concluded, obviously due to the oxygen of the air.

Professor E. Davy gave an account of a new Gaseous Compound of Carbon and Hydrogen.

The gas, which he described at the last meeting of the Association in Bristol, which is a new bicarburet of hydrogen, having been inclosed in a tube furnished with platinum wires, and subjected to a series

of electric sparks, carbon was deposited, but there was no alteration of volume. This residual gas he conceives to be new. It is insoluble in water; not ignited by chlorine; exploded with one and a half vol. of oxygen, it gives one volume of carbonic acid and some water. This gas would therefore appear to be a binary compound, and to be represented by the formula C + H. Professor Davy stated, that his investigations were not concluded, but that he hoped to be able to give a fuller paper on the subject at the next meeting of the Association.

Professor Johnston described verbally his Analysis of a variety of Hatchettine, which was found in a coal-mine near Newcastle.

This substance was found to consist of three distinct principles; the one being soluble in cold, the other soluble in hot ether, and the other nearly insoluble in both. The first was the most abundant of the three, and upon analysis was found to be a binary compound of carbon and hydrogen, and therefore to be an addition to the already pretty extended lists of isomeric combinations of these elements. The whole mass submitted to ultimate analysis, gave exactly the same result.

Analogous substances, it was stated, had been found by Mr. Adams in Staffordshire, and also by Mr. E. L. Richards in the Welsh coal-field. The latter specimen was first nearly colourless, but blackened on the surface on exposure to the air.—Dr. Traill also stated, that he had had, for some years, a variety of hatchettine in his possession.

Professor Millar made a communication on the unequal expansion of Minerals in different directions by heat.

The slice of gypsum, he observed, which had been sent him by Prof. Mitscherlich, was a portion of a twin crystal, bounded by two parallel polished surfaces, cut perpendicularly to the direction of cleavage which passes uninterruptedly through both individuals. In consequence of the unequal expansion, in different directions, of gypsum when heated —a fact first discovered by Mitscherlich—the portions of the two individuals of the twin crystal, when heated, alter their form; and the artificial section of the two crystals, which, at the ordinary temperature of the air, forms one continuous plane, becomes distinctly two planes, making a very obtuse angle with each other, and meeting in the line of junction of the two crystals.

The alteration of the angle between the two edges that meet at C, amounts to about 13′ for a change of temperature of 100° centigrade.

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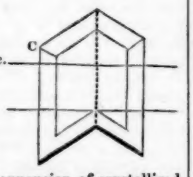
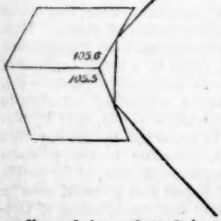


The fact of the unequal expansion of crystallized bodies in different directions, was first established by Mitscherlich, in the case of calcareous spar, by actually measuring the angle between the planes at low temperature, and when the crystal was heated. The change due to 100° centigrade was 8′ 30″. Prof. Millar's way of showing it is as follows:—Two rhombohedrons are clamped together, with their obtuse edges in contact — the two crystals are then held so that the flame of a candle may be seen, after two reflexions, one at each of the two surfaces of the crystals, which form a re-entering angle. By a well-known optical property, the angle between the candle and its reflected image, as seen by an eye close to the crystal, will be twice the angle between normals to the reflecting planes. Hence, if, when heated, the angle of each crystal undergoes a change ϵ, the angle between the normals alters by 2ϵ, and the angle between the candle and its image, as seen from the crystals, by 4ϵ.



In his observations, the image of the candle is viewed through the telescope of a theodolite. The angle through which the telescope revolves, in order to keep the image of the candle always bisected by the cross wires, of course measures 4ϵ. A good method of heating the crystals is by a small crucible, quite full of mercury, heated by a lamp, into which the lower part of the crystals is immersed, as also the bulb of a thermometer. The clamp must not be strong, but a kind of weak spring, in order that the crystals may experience no mechanical obstruction to their change of form.

Section C.—GEOLOGY AND GEOGRAPHY.

THURSDAY.

A letter from Sir David Brewster was read, containing a notice of a new structure in the diamond. This was discovered in an attempt lately made to form lenses for microscopes out of this valuable material. Some pieces being found unfit for the purpose, owing to their producing double images, these were discovered on examination to have parallel bands or veins on their surface, in the manner of a striped ribband; and consequently, there is a structure in one band different from that of another, so that the whole surface presents a combination of various optical phænomena, and we may consider each band to possess a separate specific gravity, as well as a different refractive power. So strange a structure has not as yet been observed in any other substance, and it confirms the opinion of its vegetable origin—separate layers of vegetable matter having been subjected to a pressure, so great as to be wholly beyond our conception.—Mr. Sedgwick pointed out the well-known analogy between diamond and charcoal, which was more and more confirmed by this singular discovery. He wished also to mention a fact that was rather extraordinary—in the ashes of coal, forms of a vegetable kind and structure have been observed, and yet these were composed of silica.

Mr. James Heywood submitted a communication on the coal-field of South Lancashire, occupying a space of about 250 square miles. This great deposit of coal is partially concealed by deep mosses and beds of gravel, sand and marl. On the eastern side of Lancashire, a range of gritstone hills forms a well defined boundary. From the steep acclivities above Todmorden, a transverse ridge of similar hills breaks into the central portion of the carboniferous district, and separates the southern from the northern part—among these hills, however, are isolated beds of coal. In the northern portion, the coal strata are found in the shape of a basin, whose outer edges rest upon gritstone—in the centre of this basin the inclination of the coal is very trifling, but at Blackburn this inclination becomes greater. On the western boundary the red sandstone is associated with beds of marl, often very thick, and this boundary may be traced by Mawdsley, Newburgh, and Blague Gate, to Stanby Gate and Bickerstaff; at Blague Gate the coal being inclined towards the S.E., at Bickerstaff towards the West. Coals are found at a moderate distance under the surface, from twenty to seventy yards, generally under the red marl, although near Prescot hazles overlie them; north of that town they are cut off by a large mass of sandstone. A long promontory of the same rock also stretches out to the N.W. of Manchester, as far as Ringley bridge, and bounded on its north-western side by an enormous fault of 1000 yards, downcast to the east—this may be seen between Clifton and Ringley. On the western side of this fault, the coal sandstones dip 10° to the S.S.W., and on the eastern side they are almost horizontal, the interval being filled up with a collection of rectangular prisms of the sandstone. On the south-western side of Manchester, the new red sandstone may be traced along the Irwell and then on the Mersey. On the N.E. side of Manchester coal is found in various places—the red rock intervenes at Bank Bridge, on the eastern side of Bradford; afterwards the coal continues to the gritstone boundary of the district. Limestone is found at Whiston, on the south side of the Liverpool and Manchester Railway. Magnesian limestone occurs at Bedford, nine miles west of Manchester, dipping conformably to the new red sandstone. Coal is worked very near this, and it may probably extend under the magnesian limestone. Carboniferous limestone is to be seen at Ardwick, alternating with shales, and dipping S.W., conformable to the other beds. Generally speaking, the coal strata east of Manchester, under the gritstone, dip to the west, and to the north their dip is towards the east—the highest mines being found near Manchester, and the lowest towards the gritstone hills. The red rock fault of the Irwell causes a singular phænomenon of the position of the strata, the low mines being found on its west side, while to the eastward the high mines again begin; there are also other faults parallel to this in their direction, which is N.N.W. An anticlinal line is formed by a fault near Heywood, in which the sandstone dips 5° to the S.W. below the fault, and 10° to the S.E. above it. The levels of the coal strata are usually cut off by the principal faults at an acute angle, so as to give to the horizontal section of the coal field, the appearance of an assemblage of rhomboidal prisms.

Mr. Williamson then explained to the meeting a drawing of sections of the Lancashire coal district. He does not describe the strata as they occur in a direct perpendicular descent, but, commencing at a particular point on the surface, he records those beds that are found to where a fault takes place; he traces this fault as far as it extends, and then describes the strata that succeed, until he meets with a second fault, then another set of beds, and so on. He gave a number of valuable remarks on several of the strata. After mentioning the well-known saliferous rocks, he noted the almost total absence of the magnesian limestone—so important a member in the north of England. He mentioned the lower red sandstone that underlies this, and the singular limestones near Manchester, containing fresh-water shells, which were described by Prof. Phillips, at the Bristol Meeting of the Association. He exhibited a number of beautiful drawings of organic remains, some of which are very singular; including vegetable fossils, teeth of sauroid fish; but the most interesting were of fossil fish, which Mr. Williamson conceived to have a close resemblance to the recent salmon. In mentioning the coal strata of Wigan, he pointed out a remarkable seam of impure cannel under the Smith's coal, which seam contains fresh-water shells. Some of his drawings represented *Goniatites* and *Pecten papyraceus*. He thought it very likely, along with some other geologists, that the different coal basins of England are parts of a great whole. He showed drawings of fish scales found in the coal strata. These have a close resemblance to the scales of recent fresh-water fish, and form an additional argument in favour of the formation of coal beds originally in fresh-water lakes or estuaries—perhaps the latter, as he found also some shells, evidently marine.

Mr. Williamson was succeeded by Mr. Pease, who exhibited a map, on which were marked lines, representing the dislocations in the coal-field of Wigan. He divided them into two kinds, main faults and cross faults, the latter of which sometimes run out. The lines upon the map had a singular appearance of regularity, and are valuable data for such geologists as Mr. Hopkins, who applies the powers of mathematical science to elucidate geological phænomena. Mr. Pease also exhibited some specimens of coal, in which the fibres very visibly assume a determinate direction—they point from N. 15° W. to N. 25° W.

Mr. Logan made a number of observations on the Coal basin of South Wales. He remarked the very extraordinary parallelism of the faults of this district, which uniformly assume a magnetic north and south direction, coinciding, also, with the jointed structure of the rocks. It is usual, before coming to a master fault, to meet with one or more smaller ones, parallel to it, and throwing the measures up and down in the same direction. These master faults appear, in general, to run across the whole basin, and to extend into the old red sandstone. Minor faults occasionally branch from the large ones, and perhaps, in some instances, two very considerable faults merge into one: in this case, both the faults seem to throw the measures the same way. The measures often dip differently on the opposite sides of a fault; and faults often diminish towards their extremities. They are seldom quite perpendicular, and their dip or underlie is generally towards the downthrow;

and hence a portion of strata between any two would assume the form of a wedge—and no working has penetrated to the bottom of these wedges. The faults are of various breadths, from a few inches to many yards. The coal on one side of a fault is often different from that on the other side—that on the upthrow side frequently containing a smaller quantity of bitumen. On the north-west side of this coal basin the non-bituminous, or stone coal, occurs, and the bituminous towards the south-east—the region between contains coal of an intermediate quality. Mr. Logan considers the change of quality as caused by internal heat. He mentioned two anticlinal lines, one running from Pont ar Dawe to Rhyd y Mardi, the other from Loughor to Swansea. In the mountain limestone to the east of Cefn Bryn, are two waves or ridges, running east and west. The millstone grit appears above the limestone, along the northern rim of the basin, and at Llanrhedian, on the southern side, near which locality wavellite also occurs.

Mr. Sedgwick having stated that he would now receive the observations of any one present upon these several papers on the coal strata, Mr. Phillips came forward, and spoke of the regularity of the fibrous structure of coal as forming an important cause of its cleavage—this regularity of cleavage enabling the practical miner to work it with more facility. He referred to the two kinds of faults depicted on Mr. Pease's map, and pointed out, that the lesser are often swallowed up by the greater, and that the two kinds do not cross each other at right angles. He made a remark on the law of dislocation of stratified matter—the planes of fissure having often their inclination in the same direction as the beds thrown down.—Mr. Hopkins said, there were two questions relating to the lines on Mr. Pease's map—were they the consequence of the structure of the mass, or were they caused by external force? He conceived the structure of the mass to be an independent circumstance, but that external force might be modified by it; the direction of the planes of dislocation depends upon circumstances, but he conceived that intersecting forces will be found to be at right angles. Between the geological features of a district, and the planes of dislocation, there must be a coincidence; and he had observed, that in cases of metallic veins their inclination was greater than that of beds of coal. He praised the correctness of Mr. Pease's determination of these lines of dislocation: and, had that gentleman mentioned also the lines of basset, the chief elements of calculation would have been supplied.—Sir Philip Egerton was requested by the President to give his opinion respecting the fish, supposed by Mr. Williamson to resemble the recent salmon; Sir Philip referred to the arrangement of fish proposed by M. Agassiz, and to their geological distribution. The salmon is ranged by that eminent naturalist, under the division of Cycloidal fish, and remains of these have not been discovered in any system below that of the chalk. The fish delineated by Mr. Williamson might be referred to the genus Colopticus, and the teeth to *Diplodus gibbosus*.—Dr. W. Smith remarked, that the specimens of coal exhibited by Mr. Pease would point out a mode by which coals could be touched without dirtying the fingers—what are technically called the top and bottom being the soiling sides, but the cross cleft is clean.—The President said, it was a thin layer of mineral charcoal that caused the soiling. He again spoke of the uncertainty of the lower red sandstone, instancing a very old member of the series, discovered in Lancashire by Dr. Smith. He alluded to the value of coal strata in geological sections, as being good geological constants, or base lines to work from, in investigations of different phænomena. He spoke also of the fears of exhausting our coal mines; he conceived there was as much coal already discovered, as would last for a very long period, and in the meantime more might be found; besides, in the process of discovery, which of late has made such extraordinary strides, some new mode of producing heat may be employed.

Mr. Smith, of Jordan Hill, made some observations on the changes of level of land and sea, that have last taken place, instanced by the occurrence of recent marine shells and gravel at various elevations. He mentioned the shores of the Solway Frith, and of Ayrshire, the neighbourhood of Paisley: also Portrush in the northern part of Ireland, and the late observations of Mr. Lyell, in Sweden. The alluvial clay of the Forth is elevated sixty feet, that of Essex 150 feet; indeed, recent shells have been found by Mr. Gilbertson in some places at an elevation of 300 feet. On the shores of the Clyde, over a deposit of erratic blocks, is a stratum of shells, which contains fourteen new species not now found in the river; this is a singular occurrence, as in other parts of Great Britain the erratic blocks overlie the newer Pleiocene strata, to which Mr. Smith refers this stratum.

Captain Portlock concluded the business of the day, with a communication on some of the phænomena of the new red sandstone of Ireland, which identified it in some respects with the same formation in England. He alluded to his having exhibited at the Dublin meeting of the Association, a specimen of the sandstone from Roan Hill, near Dungannon, in the County of Tyrone, containing fossil fish that had been named by M. Agassiz, *Palæoniscus catopterus*, and which genus has been since found to extend below the new red sandstone formation. At Roan Hill, Captain Portlock has made a further examination, and has found that the sandstone is conformable with the coal strata, and that, although excavations were made to the east and west of the place where the fish occur, no more could be discovered, but they seemed to be confined to one spot. However, in their examination he brought to light another fact of some importance; he found a shaly sandstone with interstratified layers of clay, and in this clay are impressions of shells, very similar to those described by Mr. Murchison on the first day, as occurring in a sandstone of the Midland counties of England, which sandstone Mr. Murchison regarded as the keuper, from its being superior in position to that described by Mr. Yates, and which was evidently *Grès bigarré*. Captain Portlock is therefore inclined to regard the sandstone of Roan Hill, as belonging to the keuper, or upper division.

Section D.—Zoology and Botany.

THURSDAY.

There was no meeting on this day, in order to enable the Members to avail themselves of the Earl of Derby's liberality, in opening his collection at Knowsley, to their inspection. We shall insert an account of the visit in our Concluding Observations.

FRIDAY.

Mr. Vigors proposed, that the warmest and most cordial thanks of the Association be given to the Earl of Derby, for the liberal manner in which he had thrown open his collections to its members, and especially for the urbanity and liberality with which the members of the Section of Natural History were received yesterday. Mr. Allis seconded the proposition, which was immediately adopted.

The President observed, that the Rev. F. W. Hope had received a letter from Mr. Owen, in which he stated that a species of worm in the eye produced the disease called cataract. He thought this of importance, in relation to the subjects discussed before the Section on Wednesday.

The President announced to the meeting, that since they had last met, he had discovered a new plant. He had found it not among the mosses and hills of the neighbourhood, but on the window of an hotel in the town of Liverpool. It was a cryptogamic plant, and existed on the body of a dead fly (*musca domestica*). He observed, that the appearance this gave to the fly, had not escaped the notice of Kirby, who had ascribed it to a kind of plethora in the insect. He was convinced, however, that it was a plant, and he believed at present undescribed. It was an interesting fact, as we had now positive evidence of the capability of the vegetable and animal kingdom living parasitically on each other, as well as on themselves. Plants living on plants, animals on animals, and animals on plants, have been long known, but now we have the singular fact of plants living on animals. They must be called Epizooites.

Professor Henslow observed, that it was not uncommon for dead flies to be covered with a species of Mucor.—Professor Lindley stated, through the President, that a disease called "Muscadine," had existed among the silk-worms of France, which had occupied the attention of the Académie des Sciences, and this was supposed to arise from a parasitic plant upon the animal. He thought the present plant was a species of the genus Botrytis.

Mr. R. Mallett then read a paper, 'On the Power possessed by Aged Trees to reproduce themselves from the centre of the Trunk.'

He observed, that trees, at a certain period of their growth, became decayed and hollow in the centre. This process was frequently followed by the splitting up of the tree, so as to make it resemble several trees, instead of one. He then described this process as arising from the power the bark possessed of depositing new wood, when the old became decayed. The new wood thus deposited, becoming covered also with fresh deposited bark, was the cause of the entire removal of some parts of the old bark, and the formation of the separate trunks alluded to. But the process did not stop here, as the deposition of wood kept on, and frequently filled up the interior of the tree, that had been formerly decayed. The centre of the tree appearing to be filled up with "liquid wood." In proof of his views, the author exhibited several drawings of fine old trees, as the Mulberry at Battersea, the Cobham Chesnut, the Fortingal Yew, a Beech in Windsor Forest, &c.—Mr. Mallett also exhibited some very fine specimens of crystallized Hæmatine, the colouring principle of the Logwood tree (*Hæmatoxylon campeachianum*).

Professor Henslow differed from Mr. Mallett; he had seen tree grow within tree, and was more inclined to attribute it to the accidental deposition of a seed within the old tree, than to any deposition of new wood. According to Mr. Mallett, the growth of trees might be eternal, but this was an unphilosophical assumption.—Mr. Duncan stated, in confirmation of Professor Henslow's views, that he had seen a sycamore growing within a lime.

Mr. J. Smith exhibited to the meeting, two species of undescribed shells of the genera Fusus and Serpula.

A paper was announced by the Rev. J. B. Reade, 'On the Solid Materials found in the ashes of Plants and Animals.' As the time was short, and the paper was long, and the subject stated to have been brought before the public in the *Philosophical Magazine*, the reading of the paper was deferred.

Professor Henslow stated, that he believed the object of the author was to prove, that all plants contained more or less silica; that the silica left after burning assumed different forms, according to the species of plants, and that this process might probably be applied to the investigation of the species of fossil plants.

Professor Lindley made some remarks 'On the structure and affinities of Orobanchaceæ.' He stated, that this order had been usually placed near Scrophulariaceæ, and in his 'Natural System' he had included it in the Scrophulal alliance. In their didynamous stamens, superior ovary, and monopetalous flowers, they resembled Scrophulariaceæ. Schultz had placed this order near Gentianaceæ, on account of their fruit and placentation resembling those of this order. Other botanists had placed Orobanchaceæ near Monotropaceæ, on account of their membranaceous foliage and parasitical habits. There was one important point, in which they differed from Scrophulariaceæ, which was the position of their carpels, with respect to the axis of inflorescence. In Orobanchaceæ, the carpels were right and left, or perpendicular to the axis, whilst in Scrophulariaceæ they were fore and aft, or parallel to the axis. This pointed out another affinity with Gentianaceæ, which had its carpels in the same position. With regard to its affinity to Monotropa, there was a point which had been much overlooked by botanists, the presence and absence, or large and small quantities, of albumen in the seed of plants; he had found this a very constant character, and one of the best for indicating the affinities of plants. Both Monotropaceæ and Orobanchaceæ were distinguished for a minute embryo, lying in a large quantity of albumen. Monotropaceæ was a polypetalous order, but its structure generally compelled botanists to place it amongst monopetalous plants, near Pyrolaceæ and Ericaceæ. He remarked by the way, that the division of plants, according to the presence or absence, cohesion or non-cohesion, of the petals, was very artificial, and hoped that it would soon be abandoned. He thought that the affinities of Orobanchaceæ were stronger with Monotropaceæ, Pyrolaceæ, and Gentianaceæ, than with any other orders. The Professor then made some remarks 'On the Placentation of Orobanche,' which he said had made him to doubt the correctness of the present theory of the situation of the placenta. It was generally sup-

posed, that the seat of the placenta in the carpellary leaf was its margin, so that it would be necessarily placed alternating with the dorsal suture or pistil. Exceptions, however, frequently occur, as in Parnassia, Papaveæ, &c.; and the placenta is spread over the whole surface of the carpellary leaf, or on various parts of it. In the carpels of Orobanche there are evidently two placentæ, but having no communication with the margin of the carpellary leaf. He therefore inferred, that any part of the surface of the carpellary leaf might become ovalized. He was borne out in this opinion by the fact, that leaves which occasionally produce buds, produce them from all parts of their surface, as seen in Ornithogalium, Nymphæa, Britonnus, &c.; the production of buds on leaves and ovules in carpels being analogous processes.

The jaws of a very large shark, caught by Captain Nash, and some oil from its liver, were then exhibited. The jaws were about three feet in width; the liver was supposed to have yielded thirty gallons of oil.

A specimen of the *Goliathus magnus*, was also exhibited. This is the largest species of insect known, measuring three or four inches in length, and one and a half in breadth. It is also very rare, only three specimens existing at the present time in the cabinets of Europe.

The President then exhibited some wood from the new pier at Southampton, that had been attacked by the *Limnoria terebrans*. He had been applied to, by Captain Du Cane, mayor of Southampton, for his opinion as to what was the best course to be pursued, as the existence of the pier was threatened by these devastating animals. He had recommended, that stone be substituted in the pier for wood. He believed that this was the only plan, for wherever wood was exposed to the *gentle action* of salt water, these crustaceous animals attacked it. They never attacked wood exposed to the more violent action of the waves of the sea.

The Rev. F. W. Hope stated, that a memoir had been published on this subject, in the last volume of the Transactions of the Entomological Society. He had recommended gas tar to be applied over the wood, but as this would require renewing, it would in the end be as expensive as covering the wood with iron, he should therefore prefer the latter plan. He had heard, that Kyanized wood was not attacked by white ants, and he thought it might be applied to prevent the attacks of these terebrating animals. These remarks led to a general conversation on the subject of preserving wood from the attacks of insects and crustacea, as well as the bottoms of vessels from the adhesion of plants. The President observed, that he had seen vessels with tons of algæ, polypiferæ, and other plants and animals, attached to their bottoms. Experiments were related, and observations made by Messrs. Francis, Hope, and Gray, and Professor Henslow; and Mr. Francis was requested by the President to draw up a paper on this important subject, to present to the Association at their next annual meeting. Mr. Francis stated, that sap-wood, exposed to the action of chloride of mercury, became as durable and fit for use as the heart-wood.

Mr. Gray then introduced to the attention of the meeting, several new species of the shells of Gasteropoda. He observed, that not a day passed in Liverpool, but he found some new or undescribed species of animal, and he trusted this fact would awaken the naturalists of Liverpool, if there were any, to a sense of the splendid opportunities their port afforded, of extending our acquaintance with both the animal and the vegetable kingdom. The first was a new genus of land shell, intermediate between Helix and Anostoma. 2ndly, Several new species which he designated as follows: *Achatina Funita*, *Carocolla filomarginata*, from India, and *Paludina Yatesii*, which is one of the largest and most beautiful species of this elegant genus. He then introduced a species of Unio, new to this country, and discovered by Mr. Gilbertson, of Preston, a zealous and exemplary naturalist, at Broughton, near Craven, in Yorkshire. The species was *Unio Roysii*.

Mr. Vigors stated, that he was sorry not to be able to read his paper, 'On the Classification of Birds' to the Section, at their present meeting. He was not sufficiently prepared to lay before them distinctly, his views on this important subject. Ever since the publication of the philosophical views of their honoured President, on the classification of the animal kingdom, in the year 1819, he had directed his attention to this subject, and he hoped next year to be able to lay before the Section the result of his labours.

The President, in absence of other matter, referred to the insect *Goliathus magnus*, that had been placed on the table. He believed this to be *G. giganteus*. It was one of the rarest insects known. It had been offered for sale at the price of fifty guineas, and he had himself offered twenty guineas for a specimen. It belonged to the extensive family of the Cetonidæ. This family was one of the most extensive and best known groups of insects that we possessed, and afforded the best opportunities for acquiring ideas of general arrangement. It contained 600 species, only six of which were British. The family *Buprestidæ*, perhaps equalled them in numbers. He then made some remarks on the forms of the section Goliathides. They might be reduced to five principal forms of structure; the four first characterized by the forms of their labium, the last by the situation of its epimera.

The subject of the growth of trees being again introduced by Mr. Duncan, Professor Graham stated, that he had lately seen an instance, in which the branch of one fir tree had been transferred to another, by the union of the wood of the two branches, which had been accidentally brought together, and subsequently separated. He had seen also a beech and horse chesnut united, and another instance of union between the ash, elm, and holly. He thought it impossible, that the fluids of the different trees in these cases should be transmitted generally through the united trunks. There must be, however, organic connexion between these trees, and he was puzzled to know the kind of union that existed.—Professor Henslow doubted, whether organic connexion existed in the cases related; a very close approximation might take place, but he questioned the possibility of an organized interval.

The Rev. F. W. Hope exhibited some rare insects he had found in the collection of Mr. Melly, of Liverpool. The first was a female specimen of the *Cheloderma Childreni*. The second *Chiasognathus Grantii*, and the third a very curious species of Curculio.

Some other papers had been announced, but as the time for closing was near, the President, after adverting to the most important points in the proceedings of the Section, dissolved the meeting.

Section E.—Anatomy and Medicine.

THURSDAY.

The Secretary read a 'Report of a Provisional Committee of the Medical Section appointed to investigate the compositions of the various Animal Secretions, and the organs that secrete them; and on the analysis of solid animal secretions.'

The paper stated that the Sub-Committee had not been able to complete their labours, and that the matter, particularly of the first, was preliminary. The analysis of glands and secretions was difficult, and had been little attended to. They had looked out for a standard of comparison, and had adopted the one which had been used to ascertain the chemical composition of solids and blood. The method followed was to try what was soluble in certain mixtures, and what was insoluble;—1st, soluble in ether—2ndly, in water—3rdly, in water and alkali, and 4thly, insoluble. Certain principles were common to the blood: so were those principles common to the various glands, as blood, serum, albumen; but they were different constituents in various glands. Cholesterine was not peculiar to the liver; it was found in different parts of the body, blood, and secretions. They would submit to the meeting the processes to ascertain the secretions by the standards already mentioned.

Dr. Roget here interrupted the reading, and said, the remainder was replete with numerous manipulations and chemical processes, and since the whole would be published in the Transactions, he put it to the Section whether, as their time was so short, enough had not been read.—Dr. Williams said, the Report contained matter for fifty committees, and should certainly be made public to the profession.

Mr. Simpson commenced a paper on Cholera, and was proceeding to show the contagiousness of that disease, by human propagation from Edinburgh to the surrounding villages, when Dr. James Johnson submitted to the President and meeting, that the paper contained only what was known, and had been often discussed. After a few words from the President, Mr. Simpson said he would not occupy the time of the Section, but would print his paper for circulation.

Dr. G. C. Holland next read a paper 'On the influence of the Respiratory Organs on the circulation of Blood in the Chest.'—The author prefaced his paper by remarking that the present inquiry was only a small part of a more general one—one which indeed embraced the investigation of mental influence on the heart, stomach, alimentary canal, liver, kidneys, the secretory organs generally, and the muscular and nervous systems. He did not, he stated, mention these circumstances for the purpose of securing for the present inquiry the indulgent consideration of the Section, for, though it was only a part of a comprehensive whole, it was nevertheless sufficiently independent to be judged by its principles. There is, perhaps, no department of Physiology that has been more diligently cultivated than this, and none in which more ingenious experiments have been performed. In our own day the researches and experiments of Barry, Poiseuille, Magendie, Carson, Bourdon, Arnott, and Wedmeyer, are too well known to require any detailed account. There is little agreement in the theories of these distinguished physiologists respecting the influence of respiration on the circulatory system. Some regard it as exceedingly limited, and others contend that it is not only the principal, but the sole agent in the production of this effect. Dr. Holland said, he had long and sedulously investigated the influence of respiration on the motion of the blood, and the result of his inquiries and experiments on himself was, that it is not great in the ordinary and the unexcited conditions of the animal system, but peculiarly marked when the function of inspiration or expiration is unusually active or disturbed.

In the progress of this inquiry it appeared, that strong mental emotions, whether exciting or depressing, greatly disturb the circulatory system. If this fact be satisfactorily established, the argument founded on it will not be liable to objection, because it is based on exceedingly deranged conditions of the vital powers. Cases of this kind, like the experiments of Barry, illustrate the influence of respiration only in extreme circumstances, but it is under these circumstances that the direct agency of the brain on the heart is supposed to be peculiarly evident, and therefore it is perfectly legitimate to appeal to such cases in corroboration of a different theory. In ordinary breathing there is no evidence that the heart is influenced by the brain, such influence being supposed to occur only under peculiar circumstances; but those, whatever be their nature, may be shown to produce or co-exist with great disturbance of the respiration, of which immediate disorder of the circulatory system is a necessary effect.

The expansion of the chest occasioned by a deep inspiration, facilitates the flow of blood towards two different points—the right and left auricle,—between which the circulating fluid has no continuous connexion, nor is the impulse felt by one portion communicated in the slightest degree to the other. The contractions of the heart are modified according to the quality and quantity of blood which it receives. An increased quantity determined to it, without having undergone any additional chemical changes, invariably augments the frequency of the pulse, but diminishes its strength; a fact which Dr. Holland had repeatedly proved by experiments on himself. On making a series of deep inspirations, the contractions of the heart were accelerated, but proportionably enfeebled, and the same effect is always observed in cases of sudden and powerfully depressing mental emotions. When the increased quantity of blood is more stimulating than usual, the contractions are likewise accelerated, but, at the same time, greatly augmented in force. The capacity of the heart is, therefore, continually modified, emitting, at one time, an exceedingly small and feeble, at an-

other a much more copious and invigorating stream. It is important to keep in mind that the weak and thread-like current is not attributable to any deficiency of blood either at the right or left auricle, the proportions in both being greatly increased by the causes which have disturbed the functions of the circulatory system. It was further remarked, in direct corroboration of this fact, that whenever congestion takes place within the chest, if unaccompanied by inflammation, the action of the heart is generally, if not always, enfeebled. In most such instances the pulse is found frequent and small, and even in the exceptions, if not frequent, it is weak. It was afterwards shown, that whenever this condition of the thoracic organs has continued for some time, syncope and palpitation of the heart often occur on the individual making a deep inspiration. Previously to this, the heart receives only a small quantity of blood—a quantity, however, strictly proportioned to its capacity, which is greatly diminished from that which it possesses in a state of health; and even this is occasionally propelled with difficulty, and is sometimes interrupted in its course, when a slight addition is made to it, by a forced or deep inspiration, or by the least bodily exertion. These phænomena, which are of no unusual occurrence, show that when the heart is only just capable of transmitting forward the small stream which it receives, it is extremely liable to be arrested or disordered in its action, not indeed from the direct influence of the brain, but from any cause producing determination of blood to the chest. With such data, the difficulties of this inquiry, the Doctor said, were greatly lessened. If, in one instance, the cessation of the action of the heart arises from the inward determination of blood, is it unphilosophical to suppose the same cause to operate in another, when it may be indisputably shown, that there exists the same condition of the circulatory system? The author, after these remarks, entered upon the investigation of the influence of respiration on the motion of blood within the chest; on the motion of blood in the arteries and veins; and lastly, attempted to show how the qualities of the blood are modified by a preponderance of expirations produced by exhilarating mental emotions.

Dr. Carson differed from the writer. He thought that circulation was but little influenced by respiration—he meant as to force and quantity. There was another matter to be taken into consideration, which left the blood in a great measure in the same situation on inspiration and expiration, and that was the reception of air, by which means the expansion of the chest was accounted for without having any effect on the pressure or suction of the blood. The theory of the oxidizement of the blood in the lungs was considered to be exploded by recent physiologists, and that the air passed into the blood as it was; therefore that oxygenation did not arise from any change in the blood. When a weak person sighed, his circulation was improved. What was the cause? By a deep inspiration the lungs expanded with more force; the heart imbibed a larger quantity of blood, and the circulation was improved. He considered, with Dr. D. Barry, that by inspiration the blood was not in any degree aided in coming to the chest.—Dr. Holland replied, that he had made repeated experiments, and had invariably found that a series of deep inspirations did always bring to the lungs a larger quantity of blood than previously existed. The pulse, which before had only been 70 or 75, became 85, and in some cases 90, and was proportionably debilitated. Setting aside all theory, two effects followed —change in the rapidity of the pulse, and in its force. He brought forward a theory to account for these effects. But, letting his own theory alone, it was quite clear that inspiration must have an effect on the circulation. Dr. Carson had also stated that air passed directly into the blood. He had never heard this opinion before. All they were acquainted with was, that air was so inspired that a certain change was effected by it in the blood. By chemical investigation they found that the carbonic acid gas, which was exhaled, existed as carbon profusely in the blood, and united with the oxygen inspired; hence they had carbonic acid. Dr. Carson had stated still further, that sighing improved the circulation. He had paid considerable attention to this, and he could not say that it improved it except in one way, and that was, it occasionally gave freer play to the lungs. They saw persons after being interested in any story almost suspend their breath, or, in other words, forget to breathe; and as soon as the interest of the story terminated there was a very deep inspiration, which relieved the blood in the chest. But he was satisfied, that a series of inspirations did not invigorate the system. Dr. Carson had also stated that the blood was not facilitated in its return by inspiration. Experiments had frequently been performed which proved this. But he would refer to those of the son of Dr. Neil Arnot. Yet he was under the necessity of acknowledging that inspiration appeared to have the power of bringing the blood towards the chest about an inch.

Mr. Hare, of Leeds, read a paper on Spinal Deformities. The object was to introduce to the Section the model of an apparatus used in cases of curvature of the spine, &c., and its effects were shown in several casts and drawings of lateral and angular curvature, said to have been taken before and after the treatment. The apparatus consists of an inclined plane about 6 feet 6 inches in length, with three pullies at the upper, and two at the lower end, and others according to the nature of the curve; a head-strap, of stuffed leather, passes under the chin, similar to the Hinkley Collar; the shoulder-straps are passed to the axillæ; and a similar contrivance is used for the ankles, for extension, by means of graduated weights. In cases of projection of the sternum, the patient being what is called "chicken-breasted," a regular pressure is made on that bone.

Dr. Macintosh read a communication, from a medical student, on a disease of the lungs caused by the deposition of particles of dust. It would contribute, he observed, towards the elucidation of that class of diseases affecting artisans, which had, in a more systematic form, been treated by Mr. Thackrah. In the neighbourhood of Edinburgh were many stone-quarries, and the workers in which not unfrequently died from consumption. A mason, a worker in the Craigleith-quarry, was ill; he was bled and treated for a common cold, recovered, and returned to his work. A short time afterwards he was again taken ill, and, two years after the first attack, he died. During his illness percussion afforded a dull sound; on the right side the stethoscope indicated no respiratory murmur; on the left a puerile râle. After death, the lungs presented a black appearance; 20 oz. of fluid were found in the right side, and 4 oz. in the left; there was no membrane, the pleura being fibrous, which was rare.—Dr. Alison stated he had only seen this state once, being on the pleura and cardiac portion of this kind of membrane; both lungs were completely studded with black tubercles, as if they were melanotic, and cut like cartilage. Similar projections were on the pleura, and the bronchial glands were long and hard, grating when cut with the scalpel, owing to a cretaceous secretion like bone. The analysis of this cretaceous matter showed it to be principally the carbonate of lime. In the bronchial glands were carbonate of lime, silica, and alumina. He directed particular attention to this analysis, for Dr. William Gregory has published an account of the Craigleith-quarry stone, and the analysis of this stone gave the same ingredients as those found in the lungs of the workman. Dr. Gregory found in the stone carbonate of lime, silica, and alumina. The deduction must necessarily be, that this (pointing to a preparation of the lungs which he exhibited) must be an absolute deposition of the Craigleith-quarry stone, from small particles taken into the lungs during respiration, producing consumption and death.—Dr. Macartney had seen many black glands at the root of the lungs, and dispersed through its substance, but they were not hard. It was stated that fibrous concretions in the chest were rare; this did not accord with his observations. In his museum, at Trinity College, he had placed many examples of this disease. The inflammation gave, first, condensed lymph, changed it into fibrinous, converted it into cartilage, and finally into bone.—Dr. Macintosh replied in the negative, to the question if any other part of the body contained stone.

Sir James Murray presented to the Section an apparatus for the purpose of withdrawing atmospheric pressure from the surface of the body, partially or wholly. He presented his reasons and observations to the Dublin Medical Section of the British Association, but they were not well understood, for want of apparatus and drawings. These he had now got, which, besides much labour and time, had cost upwards of 100*l.*; and he trusted, since he was becoming old, some of the Members would perfect them. The first machine was for the whole body, and resembled in form a slipper-bath, with the addition of a separate part to cover the upper portion of the body, the head only being free. The upper portion was luted to the lower, by means of a composition (used in making printers' rollers for inking the types,) and fixed in a groove; and, if necessary, the patient's face and head could be contained in a glass case, luted to the machine in the same manner, and respiration carried on by a tube. The air from the machine was removed by means of an exhausting syringe, screwed on towards the bottom part of this apparatus. He had tried this machine in the collapsed cases of cholera, and exhausted the air from the body, taking off one ton of atmospheric pressure. The consequence was, that the vessels became full and turgid, and the body, previously shrunk, was rounded and red. He had tried it repeatedly, and the same results followed. The process might be reversed, and pressure of air made on the body, even to the amount of 100 tons, without damage; but beyond this it would not be safe. He had tried it repeatedly in asthma. The principle was applicable topically, and parts of the body could be submitted to the action of the machine, modified so as to be suitable to them. He exhibited a contrivance, of a long tin tube, made air-tight, and with a piece of wet bladder round one end, which was open; at the other end, which was closed up, a small exhausting air-pump was placed. A patient, with a paralytic wrist, put his arm into this; the wet bladder was tied round his arm at the top, to make it air-tight, and the atmosphere was then pumped out of the tube. The atmospheric pressure being taken off, the limb became turgid, the circulation was increased, and the part affected was soon cured. There was another adaptation of the same contrivance to the limbs, to draw off the effect of congestion of the brain; and one to stop hæmorrhage in an injured hand, limb, or other extremity. An exhausting pump was fixed to the end of a bladder, the limb was put into the bladder, and the neck then tied round to make it air-tight. The air was then completely exhausted by means of the pump, which compressed the bladder so close to the skin as effectually to stop even the pores of the skin. The same contrivance of a bladder and exhausting-pump was also applied for the cure of ulcerated legs, by preventing evaporation of the ulcers, by exhausting the air, and making the collapsed bladder adhere tightly all round. For irregular surfaces he thought the instruments of particular value, since no dry-cupping could be used there. If this plan had been known when those melancholy deaths from dissection cuts took place in Dublin, and dry-cupping could not be had recourse to, it would have been fortunate. The machine would be particularly advantageous in withdrawing blood from particular parts to others more remote. Thus, in cases of congestion of blood in the head, where bleeding had been carried to such an extent that it would not be safe to carry it further, owing to the great general loss in the circulation, blood might be made to accumulate in other parts, as in the legs. The case of a well-known brewer in Dublin was treated on this principle, and recovered. Sir James then enumerated the kinds of cases where the apparatus might be used,—asthma, defective external circulation, aneurism, tumors, paralysis, &c.

Dr. Macartney considered the machines very ingenious; and, in reference to dissection wounds, he observed, that he used a solution of alum, keeping the parts moistened with it, and that he had never suffered any inconvenience from them.

Dr. Hugh Carlile then related two cases of remarkable malformation of the Cerebellum; and made some observations on the structure of the Brain, and the mode of investigating its functions.

Mr. Carlile exhibited to the Section a cast of the lower part of the brain and of the cerebellum, taken from a female idiot. In this instance, the whole brain was rather small, but not remarkably so, at its anterior part; and, upon dissection, it was found that the deficiency in internal structure was more marked than that arising from want of size or from imperfect form. The cerebellum was extremely small, not more than *one-sixth* of the usual size; the

gyri were few and shallow; the arbor vitæ possessed but *two* principal branches, although the usual number is six large, and one small one. The corpus dentatum, or ganglion of the cerebellum, was not larger than a very small nut, nearly smooth in the outline of its section, of one uniform light-brown colour, and manifestly deficient in the true ganglionic structure. The pons varolii was very small, and its internal grey and white substances were not so distinct as usual. The pyramids were parallel cylindric forms, and did not decussate with each other at all, or at most very imperfectly. The corpora olivaria were little prominent, and the grey matter within was obscure. The locus niger was indistinct, and not sufficiently dark in colour. The corpora striata were very small, even when compared with the brain; their white fibres were few and minute. The pineal gland was rather large, and contained a cluster of soft round bodies, in place of the acervulus. The whole character of the brain was imperfect as to *structure:* the *plexuses* were not fine, nor so much interwoven as they ought to be; and the grey substance was pale, and not in sufficient quantity. This woman was manifestly idiotic, and possessed the peculiar expression by which idiots are characterized. The upper jaw projected beyond the lower, the hair grew upright from the scalp, a circumstance which generally distinguishes those who are idiots from birth, and the countenance was extremely forbidding. The second case was that of a man who had been deaf and dumb from birth, but was not deficient in intellect. This person died of fever in the Hardwicke Fever Hospital, in Dublin: on examination, it was found that the left hemisphere of the cerebellum was wholly wanting. His muscular system was well formed, and he had possessed full power over all the voluntary movements. Yet, in both these instances, though, as observed, the cerebellum was reduced in size and defective in structure, those organs, to which these portions of the brain are by phrenologists submitted, were remarkably well developed. Two other cases were referred to; and the question was proposed, how far such cases are consistent with Gall and Spurzheim's theory.

Mr. Carlile further adverted to the particulars of several dissections of the brain in his possession, but which were too much in detail for perusal before the Section. The conclusion to be drawn from these dissections is, that in the brain of idiots the internal structure is always defective, and, in many instances, more so than the size or external form; and that in the brains of persons not idiotic, but possessing various degrees of intellectual power, very marked differences in internal structure may be observed by those who dissect the brain in the manner first proposed by Dr. Macartney, in a paper read by him before the British Association, and published in their Transactions for 1833. It is a most reasonable supposition, from the facts just mentioned, and from observation of the structure of the brain in animals, that the intellectual and moral character is much influenced by peculiarities in the organization of the various plexuses or ganglia, of which the brain essentially consists. Phrenologists have wholly neglected the internal structure of the brain, and have confined their attention to the size of certain portions at the surface; a method which is calculated to mislead,—amongst other reasons, because the surface of the brain is not the only part essential to the exercise of the intellectual and moral qualities, and size is a very inadequate measure of power, unless the structure of the part be also taken into consideration. As an example of an erroneous method of investigation, Mr. Carlile quoted an elaborate paper, by the celebrated Tiedemann, in the Philosophical Transactions, in which he concludes, from measurements of the size of the cranial cavity in Negroes and in Europeans, that the faculties of both are alike; whereas, it is well known to those who have opportunities of observing the children of Negroes and of Europeans educated together at the same school, that, as long as the perceptive faculties chiefly are employed, equal progress is made by both classes of children; but that as soon as the reflecting and comparing powers are required, as in the learning of mathematical or other inductive sciences, the inferiority of the Negro is almost uniformly made manifest. Mr. Carlile concluded, by inviting the attention of physiologists to the examination of the minute structure of the brain, and stated his conviction, that by a comparison of its peculiarities with the differences of mental capacity observed during life, much light would be thrown on the functions of different parts of this organ.

Professor Evanson observed, that these facts were inadequate to overturn the doctrines of phrenology.—Dr. Bardsley contended against the use of extreme cases, as contrary to true medical philosophy.

Section F.—STATISTICS.

THURSDAY.

Mr. Ashworth, of Bolton, opened the proceedings by reading the substance of 'An Inquiry into the Origin, Procedure, and Results of the Strike of the Operative Cotton Spinners of Preston, from October 1836, to February 1837.'

In October last there were in Preston and its vicinity forty-two cotton mills, giving employment to 8,500 hands, and requiring about 1,200 horse power to work them, and having a capital invested in them in buildings, machinery, &c. &c. of about £550,000
and a working capital employed of about 250,000
making a total of..... £800,000

The number of operative spinners employed in these mills was 660, each spinner having under his care, on an average, about 600 spindles.

The year 1836 was remarkable for great activity in the cotton trade, the master spinners were making considerable profits, or at least such was the general belief; and the operative spinners were persuaded, with some truth, that they were not sharing in the general prosperity, in the same degree as others of the same class in the neighbouring towns: their nett earnings, that is, what remained to them after paying the wages of the children employed by them as piecers, varied from 20*s.* to 25*s.* a week, and might be averaged at 22*s.* 6*d.*, which was less than what was paid for the same description of work at the same period in other towns in the cotton district, and particularly at Bolton, where the wages had recently been advanced, and which, in the disputes which afterwards arose, was assumed as a standard by the operative spinners of Preston.

It must here be observed, however, that the Preston masters had long been in the habit of adopting a uniform rate of wages, varying but little with the fluctuations in the state of their trade, whereas, in other places, and especially at Bolton, it had been the custom for the masters to raise the wages of their work-people in favourable states of trade, and to lower them at times of depression. Thus, in times of prosperity, the Bolton operative spinner may be receiving higher money wages than the spinner of Preston; but if we take into consideration the comparative cheapness of the several articles constituting the expenditure of the working man in the two towns, we shall find, (said Mr. Ashworth,) that the advantage is in favour of Preston; however, in October 1836, while the spinners of Preston were receiving in money wages 22*s.* 6*d.* a week, those of Bolton were receiving about 26*s.* 6*d.*

There existed in Preston, previously to this time, a spinners' "Trades Union," consisting of 250 to 300 members, or less than one half of the spinners employed there; but, inasmuch as it was a rule in many of the mills to give employment to those only who were unconnected with such institutions, its acts had been chiefly confined to relieving its own sick members, or contributing to the wants of other societies. In October 1836, on the occasion of the Preston spinners sending a deputation to Bolton and other places, to inquire into the current rate of wages, the "Union" first began to assume a formidable aspect. None of the Preston people, however, were officers of the union; the affairs of the union were conducted by the delegates from other towns. Great excitement was produced, and nearly the whole of the spinners, not previously members of the union, were induced, or coerced by threats and intimidating means, to join the union; and, under this semblance of strength, they, on the 13th of October, appointed a council, which commenced sitting at one of the public houses in the town.

The first act of the council was, to wait on one of the most extensive houses in the town and demand an advance in the spinners' wages, to which request the house refused to accede. Immediately after this, six spinners in the employment of this house became insubordinate and were discharged, the remaining spinners threatening thereupon to leave their work unless the six men were restored. The house then ascertained that the men were in reality seeking, by advice of the spinners' council, to obtain the Bolton list of prices for spinning: the like demands being made simultaneously by the spinners to all the other masters in the town. The masters showed no disposition to give way to these demands, and the result was, that all the spinners throughout the town united in giving notice to their masters of their intention to quit their work. The masters now held a meeting, at which it was determined to offer the spinners an advance of ten per cent. on their gross earnings, or about 3*s.* 4*d.* a week, on the condition that they would detach themselves from the union: this offer was in many instances accepted by individual spinners, but the council of the union, assuming the right to return an answer in the name of the whole body, rejected the offer of the masters, and renewed their demand of the "*Bolton List of Prices*," unaccompanied by any condition relative to the union. To these terms the masters refused to accede, and on Monday morning, the 7th of November, the spinners discontinued their attendance, and the factories were closed.

From the following statement it would appear that the offer of an advance of 10 per cent. on the previously existing rate of wages, was, in fact, (setting aside the question of the union,) a concession of all the pecuniary advance that was demanded.

	£.	s.	d.
The gross weekly wages of the Preston spinner was	1	13	6
From which, if we deduct for the amount of wages paid by the spinner to his piecers	0	11	0
There would remain for the net wages of the spinner the weekly sum of	1	2	6
To which, if we add the proposed addition of ten per cent. on the gross sum 1*l.* 13*s.* 6*d.*, or ..	0	3	4
The result will be	1	5	10

which, taking into consideration the pecuniary advantages of cheaper living of the Preston spinners, as compared with those of Bolton, was fully equal to the 1*l.* 6*s.* 6*d.* earned by the latter: from this it would appear that the struggle on the part of the operatives was rather to establish a precedent of successful resistance, than to obtain any real and tangible benefit.

The operatives of Preston ceased working, and, at the time of the turn-out—the 5th of November,—they amounted, as was stated, to 8,500 persons.

Of these 660 were spinners.
1320 were piecers, children employed by the spinners.
6100 were card-room hands, reelers, and power, loom weavers.
and 420 were overlookers, packers, engineers, &c.

Making 8500 persons.

Of this number, it may be said, that only 660 (that is, the whole of the spinners,) voluntarily left their work, the greater part of the remaining 7840 being thereby thrown out of employment.

During the first fortnight no change was apparent in the condition of the work-people. At the commencement of the second fortnight, complaints began to be heard from the card-room hands, and from the shopkeepers of the town. Early in December, when the mills had been closed for a month, the streets began to be crowded with beggars; the offices of the overseer were besieged with applicants for relief; the inmates of the workhouse began to increase rapidly, and scenes of the greatest misery and wretchedness were of constant occurrence. At this period the spinners were receiving from the funds of the union 5*s.* a week each, and the piecers, some 2*s.* and others 3*s.* a week; the card-room hands and power-loom weavers were destitute of all means of support, receiving no assistance, except such as the masters afforded them, which (except in the cases of 18 or 20 individuals, who had not joined the union) extended only to one meal a day for each person. In December 100*l.* was granted by the corporation towards relieving the general distress. Towards the middle of December, when the turn-out had lasted six weeks, it was evident that the funds of the union were nearly exhausted. By the end of December the distress had become universal and intense, and the masters came to the resolution of opening their mills,

in order to give those who wished for it an opportunity of resuming their work. In doing so, they announced their determination to abide by their former offer of an increase of 10 per cent. in the rate of wages, but to require from all those who should enter the mills a written declaration, to the effect that they would not, at any future time, whilst in their service, become members of any union or combination of workmen.

Immediately on the re-opening of the mills, which took place on the 9th of January, all the card-room hands rushed anxiously to their work, but the continued absence of the spinners rendered it impossible to give them employment. At the end of the first week after the mills had been opened, 40 spinners were at work, of whom 18 were those who, as before stated, had not joined the union, and the remaining 22 had never before been regularly employed in that kind of work. In the course of the second week the number had increased to 100, of whom some were entirely new to the work, and 3 were seceders from the union; and at the end of the third week there were 140 spinners at work, some of the additional 40 having been procured from neighbouring towns. Besides this, in two of the factories a few self-acting mules or spinning machines were substituted for common mules, thereby dispensing with the services of the spinners. As the number of the spinners increased, of course a corresponding increase took place in the number of persons employed in the other departments. Towards the middle of the fourth week the supplies from the funds of the union suddenly stopped, and those who had depended entirely on this resource had no alternative left but to endeavour to obtain readmission to the factories. On the 5th of February, exactly three months from the day on which the mills were were first closed, work was resumed in all the mills to its usual extent; but about 200 of the spinners who had been most active in the turn out, were replaced by new hands, and have since either left the town, or remain there without employment.

No systematic acts of violence, or violations of the law, took place during the turn-out; detachments of military were stationed in the town to preserve order, but their services were not required: some inflammatory hand-bills appeared on the walls, but without creating much sensation. While the turn-out lasted, the operatives generally wandered about the streets without any definite object:—75 persons were brought before the Magistrates, and convicted of drunkenness and disorderly conduct; 12 were imprisoned or held to bail for assaults or intimidation; about 20 young females became prostitutes, of whom more than one half are still so, and of whom 2 have since been transported for theft; three persons are believed to have died of starvation, and not less than 5000 must have suffered long and severely from hunger and cold. In almost every family the greater part of the wearing apparel and household furniture was pawned. In nine cases out of ten considerable arrears of rent were due,—and out of the sum of 1,600*l.* deposited in the savings bank by about 60 spinners or overlookers, 900*l.* was withdrawn in the course of the three months: most of those who could obtain credit got into debt with the shopkeepers,—the trade of the town suffered severely,—many of the small shopkeepers were nearly ruined, and a few entirely so.

The following estimate was made of the direct pecuniary loss to all classes of operatives in consequence of the turn-out:—

	£.	s.
The wages of the 660 spinners for 13 weeks, at 22/6	9,652	0
wages of 1,320 piecers 5/6	4,719	0
wages of 6,320 card-room hands, weavers, overlookers, engineers, &c. for 13 weeks, averaging 9*s.*	38,142	0
8,500		
Estimated loss sustained by hand-loom weavers, in consequence of the turn-out	9,500	0
Estimated loss sustained by clerks, waggoners, carters, mechanics, dressers, sizers, &c. in consequence of the turn-out	8,000	0
Total.. ..	70,013	0
From which must be deducted—		
Estimated amount of wages earned, during the partial resumption of work, between the 9th of January and the 5th of February	5,013	0
Estimated value of relief given by the masters ..	1,040	0
Other private charity, and parish relief	2,560	0
Allowance to the spinners and piecers from the funds of the union	4,290	0
	12,803	0

Leaving a nett pecuniary loss to the whole body of the Preston operatives of	57,210	0
(But to the town at large it may be said the loss of the whole sum of 70,013*l.*, as the amount of the deductions is mostly of a charitable nature.)		
The loss to the masters, being three months interest of 800,000*l.*, some of which, being sunk capital, was not only unproductive, but was taking harm from being rendered useless, has been estimated at	45,000	0
And the loss sustained by the shopkeepers, from loss of business, bad debts, &c.	4,986	0
Making the total loss to the town and trade of Preston in this unavailing struggle	107,196	0

Rev. Mr. Clay, chaplain to the gaol at Preston, stated that there were only three cases of felony traced to the turn-out.—Mr. Ashworth, in answer to a question from Dr. Smith, said, that the self-acting mule was only recently introduced into Preston, but that, wherever this machine has been established, the number of strikes has diminished.—Mr. Felkin observed, that the introduction of the self-acting mule was another example of the mischief which the workmen bring upon themselves.—Mr. Merritt stated, that inquiries had been made into the nature of the expectations formed by the operatives during the recent turn-out among the builders in Liverpool, which proved that their objects were impracticable, and that the inevitable effect of even partial success would have been serious injury to themselves.—Dr. Barnsley declared, that during every strike and turn-out within his experience, disease and mortality had increased in a frightful ratio.—Lord Sandon, Mr. Wyse, Mr. Ashton, and several other gentlemen, expressed their anxiety that this history of a strike should be published, and hoped that copies of it, either in whole or in part, would be extensively circulated among the operatives, in order that they might learn the fallacy of the expectations held out to them by interested men, and emancipate themselves from the tyranny of the unions.

Lord Sandon said, that it was unusual to refer to the papers read on a preceding day, but that a Liverpool gentleman had a brief communication to make respecting Mr. Langton's paper on the courts and cellars of Liverpool, which he was very anxious to have brought before the meeting.

Mr. Hodgson said, that when he heard Mr. Langton's paper read yesterday, he felt persuaded that the statement was exaggerated, deeming, from his intimate knowledge of Liverpool, that he could form a very fair estimate of its courts and cellars. But now, when, by the aid of the police, he had procured accurate returns, it appeared that Mr. Langton's estimate was under rather than over the truth. The number of courts and cellars being 7,862, and their denizens, calculated at four each cellar, amounted to 31,448 persons.

Several gentlemen, who on Tuesday had impugned the report of the Manchester Statistical Society on the state of education in the borough of Liverpool, now confessed that actual examination might lead to results very different from general impressions; and Lord Sandon took the opportunity of again recommending the formation of a Statistical Society in Liverpool.—Mr. Wyse said, that this was only one of the numerous examples in which investigation had removed the errors arising from partial knowledge; but it was sufficiently striking; and he trusted that the example would not be lost on the meeting and on the country.

Mr. Hall read a Report on Improvement of Agriculture during the last century. He directed attention to the great advantages which had resulted from the increased production of potatoes and turnips; he dwelt especially on the latter, which had greatly increased the means of supplying animal food. He also entered at some length into the import and export history of wool, but he added nothing to the information already given in our article on the woollen manufacture, in the *Athenæum*, No. 401.

Dr. Yelloly read a paper on Spade Husbandry, similar in character to that which he had brought before the Statistical Section at the Bristol meeting of the Association. He stated, that later experiments have proved that this form of agriculture was even more profitable to the landlord, and beneficial to the peasant, than he had described it in his former paper: that the piece of land, referred to in the first report, was so productive, that the gentleman to whom it belonged had taken 100 acres, which was now undergoing cultivation by the spade, with every prospect of being as successful and as profitable in proportion as the smaller quantity upon which the report was founded.

Mr. Warner stated, that there were two parishes in England where poor-rates are known only by name, in consequence of the system of cottage allotment having been introduced by the landlords; one of these was Asweby, in Lincolnshire, the other was a place in Yorkshire, the name of which he had forgotten.—Lord Sandon said he had 300 such allotments, of about a quarter of an acre each, which he let out at about 2*l.* to 3*l.* per acre, and which returned to the occupier about 3*l.* per quarter.—Lord Nugent stated several beneficial results which had followed from the adoption of the system, and the chief of these was infant labour, which made every allotment an industrial and agricultural school.

Mr. Fripp then gave an account of the inquiry now carrying on by the Statistical Society of Bristol, into the Condition of the Poor of that city. As this inquiry is still in progress, and many of its general results similar to those already supplied by the report of the Manchester Statistical Society, on the condition of the working classes, read the preceding day, we shall only give a brief analysis of the Report, and reserve ourselves for a more detailed examination when the inquiries are completed.

Mr. Fripp began by insisting on the value of such inquiries as the basis of a sound municipal economy, and a safe guide to the exertions of benevolence. The Bristol Society had commenced its labours be examining into the condition of the poorer classes in that city, taking for their guidance the schedule of queries which had been used for a similar investigation in the parish of Marylebone (see *Athenæum*, No. 486.) He recommended that this schedule should, for the sake of uniformity, be adopted in all similar investigations, introducing, however, three additional queries, respecting the country, the economical habits, and the religious profession of those visited. (Lord Sandon here intimated that he considered the last head of inquiry dangerous in its nature, and indeterminate in its results.) The inquiry had already extended to 900 families in the parish of Temple, but Mr. Fripp had only tabulated the results of 275 returns; for he had received them at too late a period to carry his analysis farther. Little reluctance was shown to answer the queries of the agent; in 280 families he only met five absolute refusals; but to some particular queries, such as condition of sleeping-rooms, amount of savings, &c., witnesses, otherwise sufficiently willing, showed great hesitation in giving information. Every care, however, had been taken to obtain and verify the facts; but Mr. Fripp deemed it right to state that the difficulties which impede the collection of accurate statistical information, even when there is no reluctance to afford it, are much greater than those not practically accustomed to such investigations would anticipate. He should also remark, that in these inquiries a close approximation to the real facts is all that can be expected. It is the *average* rather than the absolute truth which is evolved.

We must now turn our attention to some of the results of the investigation.

Number of houses examined	166
Containing of families	275 or 1.66 per cent. per house.
Consisting of persons..	1049 or 3.82 per cent. per family, and 6.32 per house.
Families having children	205 or 74.5 per cent.
— occupying one room only ..	123 or 44.7 —
— — two rooms only ..	105 or 38.1 —
— — three or more rooms	47 or 17.2 —
— — airy apartments ..	126 or 45.8 —
— — close & confined do.	149 or 54.2 —
— in distress, wanting food and furniture	96 or 35.0 —
— not having any books or tracts	60 or 22.0 —
Men who can use carpenter's tools, so as to mend their own furniture..	134 or 62.0 —
Do. who cannot	79 or 38.0 —
Children above 14 years of age not brought up to any trade or useful occupation	28 or 5.0 —
Children above 7 years of age sleeping in the same room with both parents, or both sexes in the same room ..	280, per centage not yet ascertained.

Houses with drains or sewers	108 or 45.0 per cent.
— without, or stopped	58 or 35.0 —
— with proper accommodations	112 or 67.0 —
— without, or very bad	54 or 33.0 —
— with a good supply of water	83 or 50.0 —
— without, or very bad	83 or 50.0 —

At the request of some gentlemen, Mr. Fripp read some specimens of the returns as made by the agent; we shall insert one or two, without the names.

A. B. and wife, —— Place, Temple parish.—English—Protestants—shoe-maker—one room, airy, *1s. 3d.* per week—3 boys—all sleep in room with parents—one at the pottery, 15 years old, earns *2s. 6d.* per week—parents and two boys can read and write—destitute of every comfort—have only one broken bedstead for all the family, and no clothes to cover them.

C. D. —— Court.—Spinster—char-woman—occupying one room, at *10d.* per week, which is nearly falling down—no furniture—a bundle of rags for a bed—some shavings in a corner for the cat—the woman is cleanly in appearance, but the air of the room is suffocating.

E. F. same court.—Married woman—deserted by her husband—3 boys, eldest 14, 2 girls, 17 and 9—all live and sleep in the same room—no water—mother and two children can read and write—two boys work as labourers—eldest girl sews and washes—the room is filthy beyond all powers of description.

G. H. —— Street.—A widow—Irish and Catholic—9 children, 2 boys, at 19 and 17, 7 girls, eldest 16—all live and sleep in one room—only two beds for whole family—1 boy works as a labourer, 2 girls at service during the day—rent *1s. 6d.* per week—all can read and write—two youngest children go to school.

I. J. same street.—Widower and labourer—4 children, 1 boy of 17, and 3 girls, of 20, 18, and 13, all living and sleeping in the same room—family cleanly—father can read only—all the children but one can read and write—one boy and two girls out at work during the day—the man belongs to a benefit society.

These, and even more painful details, which we do no not think it well to publish, produced a strong impression on the meeting; but no discussion ensued, as the Section was forced to adjourn, on account of the meeting of the General Committee at three o'clock.

FRIDAY.

Dr. W. C. Taylor announced, that he had just received a valuable collection of documents, respecting the colonization of Australia, the condition of the aborigines, and the state of the convict population, from Saxe Bannister, Esq., late Attorney General for New South Wales, but they had reached him at a time when it was impossible to make any statistical abstract of the papers, or to communicate with the gentleman by whom they were supplied; but he trusted, that he should be enabled to make a report on the subject at the next meeting of the Association.

Mr. Urquhart read a paper, 'On the Localities of the Plague in Constantinople.' He stated, as the result of three years' observation, that this disease, if it did not originate in localities close to cemeteries, was greatly aggravated by the proximity of burial-grounds, especially when the towns and villages stood on a lower level than the neighbouring cemeteries. It was known, that the Turks from religious prejudices made their graves hollow, and placed a very shallow covering of earth over the dead. The mephitic vapours arising from the putrescent bodies, tainted and polluted the surrounding atmosphere: and that this disease was connected with atmospheric influences, was a fact known to the Turks themselves; among whom it was commonly said, that birds abandoned the localities where plague prevailed, and fruits became more abundant. Mr. Urquhart declared, that these observations were confirmed by his own experience; he regretted that he had no statistical data to offer to the Section, and hoped that, attention being now directed to the subject, it would lead to the prosecution of a more regular inquiry.

Mr. Wyse said, that his personal experience in Syria, Turkey, and Egypt, enabled him to corroborate Mr. Urquhart's statements; he had never passed the large cemetery, near the gate of Adrianople, without a distinct perception of noisome effluvia, which in humid weather was peculiarly offensive. He trusted, that the attention of government would be directed to the subject, and a series of questions addressed to the consular agents in the Levant.—Dr. Bryce said, that he had long directed his attention to the subject of plague, and made numerous observations during his residence at Constantinople; but scarcely had he formed an hypothesis, when it was contradicted by some new facts. Mr. Urquhart's remarks had first given a ray of light to guide investigation, and from many circumstances which now occurred to his mind, he was led to place considerable reliance on Mr. Urquhart's account.—Colonel Briggs stated, that the plague was unknown in India, which he attributed to the custom of burning the dead. It was anciently unknown in Egypt where the dead were embalmed; among the Parsis, who expose their dead in a walled cemetery, to be devoured by the birds of the air, plague rarely or never occurs. In the countries which now constituted Turkey, pestilential diseases were very rare in the classical ages.

Mr. Bermingham then read a paper, 'On the Reclaiming of the Bog of Critt, in the County of Galway;' but he stated, that the experiment was only in progress, and that the return could not yet be satisfactorily ascertained. He promised, however, to bring a detailed report to the next meeting of the Association. A desultory conversation ensued, from which it could only be inferred, that very little was known on the subject, and that accurate information, both as to the outlay and probable return, is highly desirable.

Colonel Sykes then gave an account of the proceedings of the Agricultural and Commercial Committee of the Royal Asiatic Society, which have been already reported in the *Athenæum*.

Mr. Walmsley read a report, 'On the State of Crime in the Borough of Liverpool.' This was intended as an answer to Mr. W. R. Greg's paper 'On Statistical Desiderata,' published in our Report of the Bristol Meeting, (see No. 462). Mr. Walmsley stated, that Mr. Greg had confessed to one misapprehension in his censures on the first report on the State of Crime in the Borough of Liverpool, for instead of allowing 470*l.* a year to each criminal, it did not allow quite 80*l.*, which could not be considered as an excessive temptation to a life of crime and sin.

"The report gave, as the result of rigid inquiry, a criminal population to this town of 4200 females and 4520 males, 2270 of the latter being professional thieves, and the remainder occasional thieves, living by a combination of labour and plunder; and the whole was set down at upwards of 700,000*l.* This does, at first sight, appear incredible; but an investigation, pursued with much labour, and not unattended with obloquy, convinced me the statement contained no exaggeration.

"A more recent inquiry, carried on by better means, afforded by a more experienced police force, not only confirms these details, but leaves an impression that the number of criminals was underrated. In an inquiry of this kind an approximation to accuracy is all that can be expected, and all I purpose to do is to furnish the society with the most accurate data which is accessible.

"I hold in my hand two or three returns, about the correctness of which there can be no doubt. They contain the number of persons brought before the magistrates, and the number committed; the number of felons apprehended, and the number committed; they also give the age of the juvenile felons. In the year 1835, there were taken into custody 13,506 persons, of whom 2138 were committed. In 1836, there were taken into custody 16,830, of whom 3343 were committed. Up to the 13th of the present month, the number taken into custody in eight months was 12,709, of whom 2849 were committed. From July 1835 to July 1836, the number of juvenile thieves, under eighteen years of age, apprehended was 924, of whom 378 were committed. From July 1836 up to the present day, the number of juvenile thieves taken into custody was 2339, of whom 1096 were committed. There were in custody, during the same period, upwards of 1500 well-known adult thieves.

"In our report, juvenile thieves were set down at 1270; it now seems that the number was very greatly underrated, for the most expert officer does not pretend to say that one-half were taken into custody.

"In the returns made by the old watchmen, the number of houses of ill-fame was set down at 300; but this return referred only to the *notorious* ones. A full and complete return has since been made, and the real number is 655, exclusive of private houses in which girls of the town reside. In all the houses of ill-fame females reside, and, allowing an average of four to each house, the number residing in such places only would be 2620.

"This return is further confirmed by the fact, that in the year preceding the inquiry, there were apprehended 1000 females of a particular description. Mr. Bacheldor, now the excellent governor of the Borough Gaol, was then our principal bridewell-keeper; he gave it as his decided opinion, and no one was more competent to give one, that not one-fourth of the females has been apprehended. In this opinion the heads of the police, deriving their knowledge from a different source, coincided.

"Another return has been placed before me, which, though not absolutely bearing on the subject, is not without interest. Of 419 individuals now in the gaol, 216 profess the religious creed of Church Protestants, 174 Roman Catholics, 8 are Methodists, 17 are Presbyterians, 2 are Unitarians, 1 Baptist, and 1 Independent. 141 can neither read nor write, 59 read imperfectly, 38 read well, 127 read and write imperfectly, and 56 read and write well."

Mr. Walmsley then proceeded to estimate the amount of property stolen, and another gentleman read a series of calculations, which swelled the sum to about one million sterling annually. It was well observed, by Mr. Greg, "no one doubted the facts brought forward by these gentlemen, but there was good reason to question their estimates."

"I am glad (Mr. Walmesley continued) to see that so great an interest is now taken in Criminal Statistics. One of our worthy magistrates, a few days since, observed that people were wont to go in search of the picturesque, but that now they come in pursuit of crime. Like Sancho Panza's hare, they start up where least expected; but the subject being disagreeable and repulsive, there is no danger, I apprehend, of this kind of research becoming mischievously fashionable."

A desultory conversation, rather than a discussion, ensued, the principal result of which was, to produce a general conviction, that no statistical tables founded on mere estimates, are worthy of confidence, and that in every case recourse must be had to direct observation.

SECTION G.—MECHANICS.

THURSDAY.

Mr. Lang addressed the Section on his improvements in Ship-building. His attention had been directed to the subject many years since, when employed in Plymouth Dockyard, where he was struck by the number of vessels sent in from the blockading squadron to be repaired, in consequence of injury done to their keels. He referred to many instances in proof of the advantages of the alterations he had suggested, and to the fact that the whole keel might be, and had been, as in the case of the *Lightning* steamer, swept away, and yet the ship continue on service without leaking. The following technical description of the plan we take from the *Liverpool Journal*.—"Mr. Lang fills up the floor perfectly solid, puts in a kelson and a keel in the usual way, bolting them well together and caulking all up. On each side of this keel he fixes another broad and flat one, and over these another, all secured in a peculiar way, by dovetailing, but so as one may come off without bringing off the other, and the whole without damaging the floor; over all he puts a false keel. The depth from the inside of the floor to the bottom of the false keel is about twice the depth of the kelson, and the breadth of the three keels under the floor a little more than the depth from the top of the kelson to the bottom of the false keel. He caulks with Borrodaile's felt, observing that, when the seam is caulked in the usual way, outside and inside, the oakum does not reach the centre, but leaves a hollow, where damp lodges, to the destruction of the timbers." This plan has, it appeared, been adopted by the English and by foreign governments. It was, Mr. Lang admitted, rather more expensive than that usually adopted in building merchant-ships.

In answer to a question put by the President, as to the lines of the *Medea*, with reference to the discussion of Wednesday, Mr. Lang stated that he did not believe he could now much improve on the *Medea*. He had inspected other vessels more lately built, and believed them to be better calculated for stowage, but not for speed. The length of the *Medea*, compared with her breadth, was as 176 to 32, and her midship section was of considerable length. —Some remarks were made by Captain Grace and others, with regard to Mr. Lang's improvements; and the President then received several calculations made by gentlemen present, with regard to the speed, duty, &c. of the *Berenice* and *Atalanta*, compared

with Dr. Lardner's calculations of Wednesday, made from the government steam-boats; and he intimated that he would himself go through the calculations on this subject, and report the result at the Evening Meeting on Friday.

Mr. Fairburn then read a paper 'On the Tensile and Compressive Forces of Hot and Cold Blast Cast Iron,' being a continuation of Tuesday's paper, from Mr. Hodgkinson's experiments.

The examination of the relative properties of hot and cold blast iron required that experiments should be made, in which the material was subjected to every description of strain. Leaving the power of adapting the experiments to the determination of some few questions of a more general nature; such, for instance, as the following:—The proportionality of the resistance to crushing to the area of section—The decrease of strength to resist crushing in long specimens, compared with those in short—The influence of form of section in resisting transverse strain—The strength of beams of best form compared with that of the rectangular. These questions, which have not been satisfactorily determined, have had considerable attention paid to them.

In order to ascertain the degree of accuracy of the admitted fact, that the strengths of rectangular beams are to each other as the square of the depth, castings were formed, one inch, three inches, and five inches in depth, and all of the same breadth and length; it is evident, then, that if the strength of each beam is divided by the square of its depth, the quotient should be the same quantity in each. On performing this operation, we have—

In Hot Blast Carron Iron	.. 428.5	427.	402.12
In Cold Blast ditto..	.. 445.8	416.7	414.5
Mean.	437.1	421.8	408.8

These numbers, taking the mean, are as nearly equal as perhaps may be expected in such a case; we may therefore admit that the strength is as the square of the depth.

Compression.—In the fracture of bodies by crushing, there are three modes in some degree different from each other. For instance, when a cylinder of cast iron, whose length is several times its diameter, has a force applied to crush it, fracture will take place by the cylinder being broken straight across, as if the force had been applied transversely. If the length is small, fracture will usually take place by a wedge sliding off, the height of the wedge being about one and a half the diameter.

The strength of a cylinder is the same quantity, provided the length is not less than one and a half, nor greater than about three times the diameter. If the length of a cylinder is somewhat shorter than one-half its diameter, it will give way by the separation of a wedge whose vertex is bruised; and if much shorter, it will be crushed by the cylinder showing one or two cones whose bases are the ends of the cylinders, the truncated vertex of one cone splitting the base of the other. It is this tendency of crushed bodies to form two opposite cones, that causes cylinders or prisms to be bulged out in the middle before fracture.

The results of a great number of experiments, when reduced to one common denominator (one inch square), were nearly equal in the first (cold blast) iron, and not very different in the other. In the latter iron they were

	lb.	lb.		
Cold Blast	.. 124023	128478	123708	
Hot ditto	.. 130909	131665	112605	111557

In the former, or cold blast iron, the area of the last specimen was to that of the first, as four to one, and in the hot blast the areas were as 6.55 to 1.

GENERAL SUMMARY.

Strength of the different irons.

Carron Iron, No. 2.

Mean ratio of transverse strength of cold blast iron to that of hot .. .. .. 1000 : 979.9

Mean ratio of cold blast bars to those of hot to bear impact .. .. .. 1000 : 1038.9

	Cold blast. lb.	Hot blast. lb.
Tensile strength per square inch in cold and hot blast iron	——	13892
Compressive strength per square inch in each of the irons	100631	98125

Ratio of compressive to tensile force:—
(In cold blast iron this experiment was lost.)

In hot blast, $\frac{98125}{13892} = 7.06342$

rather more than 7 to 1.

The transverse strains, force of impact, &c. having been given in a previous Report (see p. 686), will be omitted in the following irons.

Devon Iron, No. 3.

	Cold blast.	Hot blast.
Tensile strength, per square inch..	.. ——	21907
Compressive strength, ditto ..	.. ——	145435

Ratio of compressive to tensile force:—

In cold blast, ——

In hot blast, $\frac{145435}{21907} = 6.638$

Buffing Iron, No. 1.

	Cold blast. lb.	Hot blast. lb.
Tensile strength, per square inch, in each of the irons	17466	13434
Compressive strength per square inch ..	93366	86397

Ratio of the compressive to the tensile force:—

In cold blast iron, $\frac{93366}{17466} = 5.346$

In hot blast iron, $\frac{86397}{13434} = 6.431$

Coed Talon, No. 2.

	Cold blast. lb.	Hot blast. lb.
Tensile strength, per square inch, in cold and hot blast irons	18855	16676
Compressive strength, per square inch, in each of the irons	81770	82734

Ratio of compressive to tensile force:—

In cold blast iron, $\frac{81770}{18855} = 4.337$

In hot blast iron, $\frac{82734}{16676} = 4.961$

Dr. Lardner now offered some observations on resistance on Railways. As our object is to submit to the public the most complete report of the whole proceedings, we shall, on this occasion, and to a limited extent, avail ourselves of the reports in the Liverpool papers. The subject was one of great local interest, and appears to have been specially attended to by the local press.

The first object, said Dr. Lardner, to which attention should be directed was, the main points of resistance to be overcome by the locomotive power. He then detailed the nature of the resistance, and went over the principles expounded by Vince, Coulomb, and other writers on physics. He pointed out the difficulties of obtaining the truth by direct experiment, either by a dynamometer or by measuring velocities on inclined planes. The dynamometer he had found inefficient, owing to the inequalities in the surface of the rails, the needle dancing about so that no correct average could be obtained. Another obstacle arose from the necessity of knowing the exact inclination of the rails, in order to make due allowance both for gravity and friction. The change in this inclination he found to be very great, even where the supposed inclination as furnished to him did not indicate it. He had then tried the dynamometer first at one side of the carriages and then at the other, taking the mean indication. He had also taken the waggon first up and then down, in order to obtain the mean, but still the results were incorrect. He then suggested amendments in certain algebraic formulæ, which he contended were erroneous, the gyration of the wheels not being taken among the elements of the calculation. Thus much was merely introductory to his own plan, which was, to take a train, load it up to the full point, travel very slowly—say eight or nine miles an hour, and then, calculating the number of pounds' pressure on the piston, minus the momentum overcome, and the presumed friction of the engine, take the difference of the tractile force, on the basis of a uniform pressure of 50lb. per inch on the cylinder. This he stated to have been done, and produced the following formula:—

	Tons.	lb.	Inches.
Engine	10.1		
Cylinder, diameter			14.
Cylinder, stroke			16.
Wheels, diameter			54.
Steam		50.	
Tender	7.		
50 Waggons	73.3		
Nett load	150.		
Gross train	240.4		
Limit of force on Piston	7696.5		
Mean leverage on cranks			10.16
Limit of Traction	2996.5		
Do. Per ton	12.66		
Resistance per ton by gravity	3.40		
Limit of friction per ton	9.26		
Estimated adhesion	0.128		

The results led the Doctor to believe, that in the common estimate the friction was over-rated, and that it was probably less than 8lb. the ton. The principal novelty in the Doctor's calculations was the introduction of the gyration of the wheels, which had hitherto been disregarded.

The President inquired whether Dr. Lardner had taken into consideration the resistance of the air.—Dr. Lardner said, the action of the air was so inconsiderable, that he had not.—The President observed, that in his opinion, the resistance of the air ought to be taken into account. The pendulum of a clock is doubly affected by the atmospheric air; first, by resistance, and second, by the *sticking* of the air to the pendulum as it moves through it, which alone is so powerful, in astronomical clocks, as to make a difference of ten seconds a day. If such was the effect on a motion so minute and slow as that of a pendulum, what must it be, to say nothing of the direct resistance, on long trains forced through at high velocities?—Mr. Herapath, after expressing a hope that, as Dr. Lardner's formulæ were not to be understood in a moment, they would be given to the public in some other form, mentioned, that the results of several experiments made by him, nearly agreed with those obtained by Dr. Lardner, and, that he believed the friction to be about 8lb. As to the resistance of the atmosphere, he had heretofore made some calculations, which gave a velocity of sixty miles an hour, but found by experience, that a speed of sixty miles an hour in theory sunk in practice to forty miles, owing, as he believed, to the resistance of the air.—Mr. R. Roberts, of Manchester, stated, that in 1824 he contrived a machine to enable him to ascertain the amount of friction, but without reference to the resistance of the atmosphere, and he found that as the velocity increased the friction rather diminished. He was convinced, however, that the resistance of the atmosphere should be taken into consideration, and in proof, he stated, that on one occasion, he was on the Manchester Railway in a hurricane, blowing in the direction of the railroad, and so violent, that the power of the wind was sufficient to move the carriage even without steam. In this way he passed on at such a speed as to completely neutralize the effect of the hurricane—the effect generally was that of a calm. The observation of the President on the pendulums of astronomical clocks, reminded him of a curious circumstance which had come, some years since, under his observation, and was another proof of the resistance offered, under circumstances, by the air. Having made a top, which spun for forty-three minutes, he was requested to make another for a friend—this he did, and to give it a handsome appearance he had it lacquered, and then found it would spin only seventeen minutes; he accordingly removed the lacquer, and it then spun for thirty-seven minutes.—Mr. Hawkins, in confirmation, observed, that inconvenience having been experienced from the resistance of the air on a fly-wheel, he had greatly diminished it by reducing the surface of the revolving bodies.—Mr. Hardman Earle said, he remembered, that during Dr. Lardner's experiments, at one or more of which he was present, the steam was blown off, and he mentioned several facts, showing the great irregularity in the performances of the same engine under circumstances apparently similar.—Dr. Lardner remarked, in conclusion, that he was convinced that the amount of friction could not be much greater than that now deduced, since the adhesion was found to be within a very small fraction of the theoretical adhesion.

The Secretary presented to the Section, from Professor Whewell, some copies of a paper by that gentleman on the anemometer, and then proceeded to read a communication from Dr. Turner on a safety lamp invented by Mr. Leethead. The lamp is a brass cylinder with a glazed aperture; it is furnished with a hollow metallic sphere of about four inches in diameter, screwed to the bottom of the lamp, which it is proposed to fill with condensed oxygen gas. Of course, it would be required, that in all collieries where used, there must be a condensing apparatus and a quantity of condensed oxygen kept ready to supply the workmen.

Mr. Ettrick objected to the weight of the lamp; and Mr. Evans said the ventilation was so imperfect that it would become heated.

A model of a new telegraph by Mr. Murray, was then placed on the table, and a brief explanation given. A paper on the same subject, by Lieut. Watson, was also commenced, but not proceeded

with, on the ground that a patent was about to be secured by Lieut. Watson for his invention, and consequently he was not prepared to disclose the nature of the improvement.

The Secretary then read a paper by Mr. Curtis, on an Inflexible Suspension Bridge. The advantages of this were, first, the absence of vibration, and secondly, that each point of connexion was sustained by four opposite forces, viz. two bars radiating from the opposite piers, and the two sections of the platform, which being fixed become, together with the bank, forces to sustain the bridge. Another important point dwelt on, was the absence of the main chain. In this bridge, any bar might be removed for repairs, &c., without insecurity.

Mr. Hawkins exhibited a machine for measuring the distance between the eyes, to be used in the construction of spectacles. This distance varied greatly, and was obvious in different nations, being much greater among the Germans than among the English. The instrument consisted of a graduated circular plate, with one fixed and another revolving arm.

Mr. Hawkins mentioned, that in the same individual there was frequently a great difference between the left and the right eye; he knew a case where the focus of one eye was thirty-six inches, and that of the other only three.

Dr. Lardner corroborated Mr. Hawkins's statements, and gave the instance of Professor Airy, who had found that he was differently short-sighted in different directions; in fact, that his eye partook of the character of a spheroid, not of a sphere, and he accordingly got glasses ground on a spheroid, which perfectly suited him.

FRIDAY.

The Rev. Mr. Taylor, of York, made a Report on the different Modes of Printing for the Blind, prepared at the request of the Association. He mentioned several methods which had hitherto been adopted for this purpose. Hauy, in 1784, first invented the art of printing in relief, and in 1831 or 1832 Mr. Gall, of Edinburgh, introduced a triangular alphabet. At Boston the art has been carried to great perfection, several books having been printed in modified Italics, with good and sharp impressions. The cost of a copy of the New Testament there was 2*l.* 10*s.* Other methods had been recommended, including arbitrary characters, contractions, fretted type, and a modification of the capitals of the Roman alphabet. Mr. Taylor, however, was strongly in favour of that adopted by Mr. Alston, of Glasgow,—viz. the adoption of the Roman capitals deprived of the small strokes at their extremities, and cut with very sharp and thin faces. He objected to the use of what printers call the "lower-case" letters; and, in reference to the result of certain examinations of the pupils in their proficiency in particular systems, he observed, that the test of the merits of those systems was not the proficiency of the cleverest pupils, but of the bulk of them, and its adaptation to those who, as the vast majority of the blind must, would have the sensibility of their fingers impaired by labour. Several specimens of the different kinds of printing were handed round. Arbitrary characters he considered decidedly objectionable, as cutting off, in a great degree, the means of communication between the blind and others. For instance, at school, if the common type be used, the blind could learn with the other children, and get assistance from them. He was opposed to the use of contractions, and to printing on both sides of the page, as, in his opinion, they tended to create confusion. The children themselves declared that they preferred plain to fretted type; so that, in all points, Mr. Alston's system was the preferable one: of this Dr. Fry was the original inventor, but it had since been slightly modified. Mr. Taylor mentioned, that he was in the habit of corresponding frequently with a blind gentleman on subjects connected with mathematics—that his letters were written with an ink formed of gum-water and lamp-black, and that the gentleman in question read them with little difficulty.

Dr. Carpenter acknowledged that, after communicating with Mr. Taylor, he had, though reluctantly, come to the conclusion, that it was not advisable to employ the stenographic plan.—Mr. Oliphant, of Edinburgh, bore testimony to the disinterested labours of Mr. Taylor, and to the ability displayed in the preparation of the Report just read. He quite coincided in the opinion therein expressed, of the inexpediency of adopting an arbitrary or stenographic character in printing for the blind, but said, that he had felt some disappointment from the Report not having entered more minutely into an examination of the question, whether or not the Roman capital letters alone, or the small or "lower-case" letters of the same, or a combination and modification of both, would be adopted with the most advantage. There were only two establishments in this country in which printing for the blind was executed to any extent—viz. one in Glasgow, under the superintendence of Mr. Alston, the treasurer of the Asylum for the Blind in that city, who had adopted the Roman capital letters, as recommended by the late Dr. Fry, of London, and for which the medal of the Society of Arts in Scotland had been awarded to him,—and the other establishment conducted by Mr. Gall, of Edinburgh, who *now* used both the Roman capital letters slightly altered, and an angular modification of the "lower-case" letters. Mr. Oliphant then stated several objections against the use of the capital letters alone, such as their being all of the same height, having the same square and uniform appearance, and many of their most marked characteristics in the *centre* of the letter—a position in which, when the size of the type was considerably reduced, it was impossible for the sense of touch readily to perceive the shape of the inclosed space. This opinion was exemplified by a comparison of various letters, such as H N M, X Z, B R, O C G, and others, whose extreme points, which were alone felt by the finger when rapidly running along the line, being nearly all in the same position, would convey a similar impression. For these, and various other reasons specified, he considered it quite impracticable much to reduce the size of the type at present in use at the Glasgow press, without destroying its tangibility, and, indeed, this was admitted by Mr. Alston in an address which he had recently issued. Mr. Oliphant then proceeded to contend, that many of the disadvantages attendant on the use of the capital letters were avoided in the alphabets as recently improved by Mr. Gall. Most of the objections stated in the Report against the angular alphabet, had reference to the letters in use some time since, but these had been almost entirely obviated by late improvements in the form of the letters, by which their legibility, by the eye, was increased, while their distinctness to the touch was not diminished; and by which a considerable saving of space was effected, while it was rendered impossible for the finger of the reader to wander from one line to another—the cause of which tendency had been ascribed to the angular characters, but which he thought was as applicable to the one system as to the other. Mr. Oliphant mentioned, that during the previous week he had, in the Edinburgh school for the blind, seen children who were able to read the angular characters with eight or ten folds of a silk handkerchief interposed between their finger and the book; and that Mr. Gall, jun., though blessed with the possession of sight, had, by constant attention, acquired such delicacy of touch, as to be able to distinguish letters cut on a small pica body, a size of type in which the common 8vo. Bible is frequently printed; and that he had little doubt, but that in a few years, instead of a single Gospel occupying a 4to. volume, as at present, the whole New Testament will be comprised in that compass, and be sold at a price not exceeding 10*s.* or 12*s.* He was proceeding to give further illustrations of the desirableness of introducing the small letter, when, on the suggestion of the chairman, it was agreed, in order not longer to take up the time of the Section, that Mr. Oliphant should have an opportunity of communicating his observations, in writing, to Mr. Taylor, who was authorized to insert them, along with any additional remarks of his own, as an Appendix to the Report. A similar privilege was also conceded to Mr. Alston.

Mr. Russell then addressed the Section on Sea Walls and Embankments, following up the observations which he had made on previous occasions. There were three kinds of waves—the tidal wave, the wave of resistance, and a third species, which he termed the "secondary wave of the sea," with which sea walls had to contend. The object was to retard and diminish, or, if possible, annihilate the secondary wave. Its velocity, approaching the shore, was very nearly the velocity due to the fall of a heavy body through half the depth of the water; and thus, when speaking of the different forms of channels, he had mentioned, that by taking the centre of gravity of the cross section of the channel, you found the velocity of the wave. It was therefore retarded in shallow water, and then changed its form, especially in the anterior part, where it formed a breaking surface, or surge, which was very injurious in its effects. It might be useful, especially to vessels crossing an unknown bar, to learn, that the height of the wave was equal to the depth, provided there was no strong wind to break it; but that, in any case, the depth of the water might be greater, but could not be less than the height of the wave. It followed from this, that a wave might be compelled to break, by placing a body below, so as to make the depth less than the height. At present, various forms were given to the slopes of embankment—some were concave, and some rectilinear. The best form, however, was a convex one, with a parabolic curve, the slopes increasing as the squares of the distances, by which the wave would be made to break uniformly, gradually, further from the shore, and more effectually.

Mr. Russell, in answer to some observations, stated, that there were some modifications of the laws he had laid down, derived from the compressibility of water, &c., which he had not thought it necessary to introduce, as they were generally known; and that he had confined himself to endeavouring to make generally intelligible the results of his experiments. With respect to perpendicular embankments, he had known a very expensive pier built in that way nearly destroyed in four years. Such a form, in fact, has to *reflect* the wave, as well as break it; and this causes an evil of much importance to small vessels, for the wave thus reflected meets that which succeeds it, so that the body of one is thrown back into that of the other, the effect of which is, that the water, as it were by jolts, becomes at one moment very rough, and, immediately after, smooth, and continues alternating in this way.

Mr. J. Taylor (Treasurer to the Association) then came forward to answer any questions which might be put to him regarding the duties of the Engines in the Cornish Mines. A grant of 50*l.* had been given by the Association for the collection of accurate information on this subject, and was likely to be renewed; and Captain Lane had in his possession reports of every engine in the country from 1813 up to the present time. Being asked, whether it was true that the engine, which Mr. Henwood, on a previous occasion, rated at 95¼ millions of pounds of duty had ever performed 125 millions, he appealed to Captain Lane, who said, he had been present an hour before the experiment began; that it was a perfectly fair one; and that the engine did perform 125 millions. The experiment, however, lasted only for about twenty-six hours, and Mr. Taylor agreed with Mr. Henwood, in attributing little value to one of so short duration. It was not asserted, that perfect accuracy could be obtained with respect to the quantity of water lifted; but they could approach sufficiently near it for all practical purposes. It was imagined that the reports were got up by the engineers; instead of which, they were a check upon them. Another test was found from the quantity of coal, which was well known, and the examination into the account books confirmed Captain Lane's report, and corresponded with the account of the duty. In the Consolidated Mines, they had 22 engines, some of them with 90 inches of cylinders, and a nine-feet stroke. The duty of each was reported every morning, and the greatest emulation was excited among the men with regard to the performances of their respective engines. They felt, in fact, like grooms about favourite race-horses, and a great saving was experienced from the care taken in consequence.

Mr. Guest said, he believed the quantity of water to be the only fair test, and hoped the Association would institute an inquiry as to the effective power of the engines.

Dr. Lardner then submitted for consideration a paper, by Professor Moseley, 'On the Thrust of Arches,' the calculations in which were so intricate,

that he would only partially enter into them, especially as they would be laid before the public in another form.

Professor Moseley had applied his formulæ to the failure of arches; and, after having made a series of experiments, the results of the table of comparison showed, that calculation and practice very nearly corresponded.

The following were Professor Moseley's formulæ to determine the pressure required to support an arch, when applied at the edges of the extreme voussoirs:—

Thrust of a circular arch, when supported at highest edges of extreme voussoirs—

$$=\frac{a^2\ a}{1+a}\left\{\frac{1}{2}(a^2+3a+2)\theta \mid \cot.\frac{\theta}{2}-\frac{1}{3}(a^2+3a+3)\right\}1$$

When at lowest edges of ditto ditto—

$$=\frac{a^2\ a}{1+1\frac{a}{2}\operatorname{cosec.}^2\frac{\theta}{2}}\left\{\frac{1}{2}(a^2+2a)\,\theta\cot.\frac{\theta}{2}-\frac{1}{3}(a^2+3a+3)\right\}2$$

Of a flat arch, when supported at lowest edges of extreme voussoirs—

$$=\frac{b^2\ c\ w}{8}$$

a = rad. of intrados. of circular arch.
$a\,(1+a)$ = rad. of extrados.
θ = $\angle$ of semi-arch.
b = span of flat arch.
c = breadth of the voussoirs.
w = weight of solid unit of mass.

Several copies were handed by the Secretary to the members of the Section, of a Pamphlet by Mr. Hall, in reply to some observations by Dr. Lardner on his improvements in the steam-engine, particularly as regarded his Condenser.

Mr. Williams then offered some observations, as a practical man merely, on a method for preventing accidents from the collision of steam-vessels, which was in practice in the vessels belonging to the City of Dublin Steam Packet Company. The danger at present arose from this—that a local injury, as in the late instance of the *Apollo*, admitted the water through the whole body of the vessel. The improvement would confine the water to the section in which the injury took place. It consisted in dividing the vessel into five water-tight compartments, by iron divisions or bulk-heads, the only objection with respect to which arose from the difficulty of fixing them in a timber frame. This was obviated by making the side of the vessel solid for twelve inches before and aft the bulk-head, and closing up the interstices with felt. As to the number of these compartments, he had found, after several trials, four bulk-heads, forming five sections, unexceptionable. The length of these sections was arbitrary; Mr. Williams made the centre one enclose the machinery, and those at the stem and stern of comparatively small length. He had, two days before, tried several experiments with the *Royal Adelaide*, having admitted the water by boring holes, first into the foremost section, next into the second, and afterwards into the third; and in each instance very little depression had been produced in the stem, never exceeding twelve inches, while there was no disturbance to the men at work. In cases of fire, too, there was a double advantage from this arrangement; the fire could not extend far under deck, so that the men could work easily in extinguishing it—there would be no current of air throughout, and the water might, if necessary, be admitted to the section attacked by the fire, without any general inconvenience, and without any danger. Mr. Williams intimated, in conclusion, that a vessel would be placed by the Company at the disposal of members of the Association returning to Ireland, as it had been to transport them to Liverpool.—The President then closed the meetings of the Section by a few remarks on the successive developement of power apparent in it. Though originally only an offset from another Section, it now rivalled, if it did not exceed any of the others, in the variety and interest of the topics discussed, the attendance of members, and the ability of the papers laid before it. He, as its original proposer, felt especially interested in its progress, and hoped to see it still more distinguished.

OUR WEEKLY GOSSIP.

We this day conclude our report of the proceedings in the Zoological and Botanical, the Statistical, and the Mechanical Sections, but must defer the remainder till next week. However strongly tempted by our interest, we could not, in conscience, slur over the valuable Reports and papers contributed by such men as Prof. Liebig, Mr. Lubbock, Sir David Brewster, Dr. Robinson, and others of equal reputation to the Mathematical, and by Drs. Macintosh, Carson, Professors Johnstone, Evanson, &c., to the Chemical and Medical Sections. We trust that such of our readers as take but little interest in these matters, will, in justice, remember that the Reports have been in double numbers, and that they have occasioned neither delay nor curtailment in other departments of the Paper; in fact, if it had not been for the Reports, we must have fallen back on foreign literature, the issues of our own press at this time of the year being scarcely sufficient to fill half a dozen columns. This week indeed there has been something of a revival among the publishers, but the result, until Sir Walter Scott's Memoirs arrived, was three novels! Nor have we chanced to hear of any forthcoming works of much promise except Miss Lawrance's 'Historical Memoirs of the Queens of England,' the first volume of which is, we understand, in the press.

The Birmingham Festival closed yesterday week. On the Wednesday evening the theatre, to the very stage, was crowded for the sake of *Semiramide* and the Italian singers who appeared in it: what a contrast from the 'Saint Paul,' which had been the morning's performance! On Thursday morning the 'Messiah' was given to an immense audience; in the evening, after the surfeiting fashion of these provincial meetings, a Concert, in which our cotemporaries tell us that Dr. Mendelssohn added another leaf to his garland (and, be it remembered, that his is not merely a Birmingham garland) by his concerto on the pianoforte. This we hope to hear for ourselves in London next spring; its composer, we believe, having expressed his intention of returning to England as soon as his foreign engagements will permit. Certainly his has been a brilliant success during his present visit, and not more brilliant than well-merited. When he left the town hall on Friday morning, after his last organ performance of Bach's prelude and fugue in E flat, even the people assembled without the building cheered him. We like to record such things, as a sign that the nation is not grown dull and cold-hearted. Again, and in proof that "the rapacious foreign singers" have been too indiscriminately maligned, we must here make mention of the noble munificence of Grisi; her last but one, we believe, was a concert at Saint Leonard's for the benefit of a charitable institution—her last was a donation of 100*l.* to the Birmingham Committee. Of Häser's Oratorio, 'The Triumph of Faith,' which was performed on Friday morning, we are not as yet qualified to speak: it seemed, however, that on this occasion the audience, who had on previous mornings been perversely self-willed in disregarding the printed requests posted throughout the Hall, that there should be no applause during the sacred performances, became dutifully obedient and listened in silence. This did not say much for Häser, but his oratorio was heard at a disadvantage, after 'Saint Paul' and Handel's master-work. In conclusion, we cannot but praise the Birmingham managers for the spirit they have shown in leaving the beaten track by the production of so much new sacred music. We must note too, that Mr. Bennett and Mr. Machin—the latter is, we believe, a native of Birmingham—distinguished themselves among the gentlemen singers;—that Mrs. A. Shaw was *encored* in every song she sung during the week (a rare compliment), and that Miss C. Novello has been engaged by Dr. Mendelssohn for the last six winter concerts at Leipsic, which are under his direction.

SCIENTIFIC AND LITERARY

HORTICULTURAL SOCIETY.

Sept. 5.—Two Communications were read before the Society, viz. 'Notes on the Cultivation of the *Chlidanthus fragrans*, by the Rev. J. Belfield,' and 'Observations on the Vegetation of Seeds after boiling, by William Wells, Esq.' A silver Knightian medal was awarded to Mrs. Marryat, F.H.S. for the collection of plants exhibited by her, and silver Banksian medals were also given for the seedling dahlias from Mr. Ansell, of the Camden Town Nursery, and for the Maltese melon from Mrs. Nichols, of Hammersmith. We noticed also melons from an open-sided frame, from John Williams, Esq., C.M.H.S.; peaches from J. A. Knight, Esq.; a very fine sort of Fuchsia, named *Fuchsia fulgens*, from Mr. John Lee; a new sort of barley of a blue colour, from Mr. J. A. Henderson; some highly-finished drawings of Orchidaceæ, from Mrs. Withers; and some newly-invented artificial stone flower-pots from Mr. Stiff, of Lambeth Walk. William Duckworth, Esq., and William Hawkins, Esq., were elected Fellows.

The report of the Meteorological Observations between the 15th of August and the 5th of September, was as follows:—

Barom.—Highest, Aug. 24 .....30.206
Lowest, Sept. 1 .....29.363
Therm.—Highest, Aug. 17 .....87° Fahr.
Lowest, Sept. 4 .....40° Fahr.
Total amount of rain, 2.38 inches.

Sept. 19.—Remarks on the Growth of Melons in open-sided frames, and on two fruits this day exhibited, illustrating the above, from John Williams, Esq., C.M.H.S., were read. The above sort of frame, a figure and description of which is given in the last part of the Society's Transactions, is described by Mr. Williams to be peculiarly adapted to the growth of the Persian varieties of the melon, as well as to fruits of that species generally, on account of the greater ventilation carrying off a larger portion of the watery exhalations of the plants.

A large silver medal was awarded to Mr. John Lee, for the *Fuchsia fulgens;* silver Knightian medals to Mrs. Marryat, for the *Hedychium Gardnerianum;* and to Messrs. Chandler, for the *Bignonia jasminoides;* and silver Banksian medals to Mr. R. Buck, for Cannon Hall muscat grapes; to Mrs. Lawrence, for *Gesneria rutila*, &c.; and to Messrs. Chandler, for dahlias, this day exhibited. The following was the Meteorological Report from September 5th to September 19th:—

Barom.—Highest, Sept. 19 .....30.144
Lowest, Sept. 13 .....29.072
Therm.—Highest, Sept. 17 .....71° Fahr.
Lowest, Sept. 5 .....39° Fahr.
Total amount of rain, 0.69 inch.

MEETINGS FOR THE ENSUING WEEK.

Mon. Entomological Society .....Eight, P.M.
Tues. Horticultural Society .....Three.
Thur. Zoological Society (*Gen. Business*)..Three.
Botanical Society .....½ p. Eight.

FINE ARTS

NEW PUBLICATIONS.

A collection of prints now before us divide themselves naturally into two classes—those domestic scenes, in which our artists are so successful—leaving the high classical to the disciples of the French school; and the imitation, rather than the revival of mystical, religious Italian art, to the Overbecks of young Germany;—the other, memorials of the war which so long kept the kindred nations of continental Europe at the distance of a sword point from each other—the village church heading one section; the Napoleon medals closing the other.

From this wholesale classification we must, however, except one of national interest—Mr. Haydon's *Reform Banquet*, engraved, and well engraved, in mezzotinto, by Bromley. To be sure, the subject was most impracticable: the formal lines enforced by the long dinner tables—the literal fidelity necessary in a picture where every head was to be a portrait, seeing that M.P.'s have not necessarily such features as "limners love to paint, and ladies to look upon"—the weary uniformity, too, of modern male costume—cannot by any legerdemain be turned into the picturesque. Mr. Haydon, however, has done

something in making the gorgeously spread board, with its plate and its piled fruits, break up the left-hand corner of the picture, and the arrangement of the draperies, &c. &c. in the background is made the most of. The picture will have an interest with many from the mere portraits here collected together: some of these are faithful and spirited likenesses—some are a little flattered, and there are a few failures; but this, among so many, was to be expected.

We now come to the domestic scenes: the first of these being *The Village Church*, painted by Mrs. Serffarth, and engraved by Egan. A rural group is entering the sacred edifice: first, a widow, with her two children; next an aged woman, supported by her daughter; lastly, two gentlemen, not countrymen, in smock frocks—one of whom presents a nosegay to the smiling young lady between them. This last group is too artificial to satisfy us; but there is a pure and delicate feeling over the whole work, which deserves honourable mention, and will attract many admirers. *The Wife* and *The Daughter*—a pair of subjects by Prentis, are beautifully rendered by Bromley. We noticed the first—a lady watching the sick bed of her husband—when the picture was exhibited in the Suffolk Street Gallery; the stillness of the sick room is happily expressed:—in the second, an ancient Scottish pair listen, while the flower of their fireside, a fair girl, reads "the Word" aloud. This is our favourite. We like the old man, who screens his ear with his hand, that he may not lose one precious promise; and his partner at his side; and we like too "baudron," (do our southern readers know grimalkin by this name?) who sits on a stool hard by, as demurely as if she, too, had an interest in the exhortation. The mention of this domestic favourite leads us naturally to Hancock's *Hot Breakfast*, in which a group of riotous tykes, her sworn antagonists, have overthrown an iron pot, and can only make acquaintance with its contents snap-dragon-wise. This artist is only second to Edwin Landseer; but is the path of art he follows high-reaching enough to make a second-best place in it worth having? The print is engraved by Porter.

We now come to the other division—to memorials of warfare: the splendid portrait of *The Duke of Wellington*, engraved by Porter, after Simpson's picture, taking precedence. The likeness is faithful and agreeable—firm, but not stern—alive without any forced life. The engraver here has done the painter full justice. Of the *Napoleon Medals, engraved by the Process of Achille Collas, with Historical and Biographical Notices*, edited by Edward Edwards, we need add little to our former judgment, that it is a most superb and complete work. Our opinion of the beauty of these medallic engravings of the French company has been again and again registered before the public. A few of the specimens, among so large a number, must be, of necessity, inferior in finish to the best; much of the fault, however, where fault there is, resting with the original medallist. Lastly, we must mention a portrait of some momentary interest—*Napoleon Louis Bonaparte*—an intelligent head, painted by Bymart, and engraved by Hall.

MISCELLANEA

Geology.—A M. Tournet has presented a long memoir to the French Academy of Sciences, containing his geological observations in the neighbourhood of Arbresle, in which he establishes some well determined affinities between the nature of those rocks which have pierced through the upper crust at different periods, as well as their direction, the soil which covered them, and their degree of fusibility, as connected with the period of eruption. M. Tournet thinks that the true and only primordial sedimentary rock is composed of clay slate, and that this rock, which contains the element of mica, being altered or modified in different manners, has been transformed into gneiss, mica-slate, &c. He admits four modes of alteration: one is calcination, a second trituration, a third the changes produced by penetration and *cementation*, and the fourth is the influence of the granite which transforms it into gneiss, by introducing its feldspath when in a state of fusion.

Fucus.—M. Arago, having expressed a desire for further information respecting the place whence the floating banks of sea-weed, seen off the Azores, originally came, a M. Bonnet communicates his observations, all of which tend to the opinion that this weed, which is called the "sea grape," and is supposed to have been brought by a current from the Bahamas, grows in the place where it is found; he says that when becalmed, and the water has been clear, he has seen detached pieces rise from the bottom in a fresh condition, which may be easily distinguished from those which have been some time on the surface; and he (M. Bonnet) is convinced that with proper materials the bottom of this part of the ocean might be reached. This gentleman states that in one of his voyages, when in 23° 26′ north latitude, and 44° west longitude, the water became quite muddy, and formed a turbid line north-east and south-west, which was half-a-mile broad.

Encroachments of the Sea.—It is well known that the Baltic Sea, generally speaking, makes inroads upon the surrounding shores, but there was an idea that Prussia resisted these. The researches of a Polish gentleman, M. Domeyko, have, however, proved that this country has shared the general fate to such an extent as to lose a whole province, on the borders of the Gulph of Konigsberg. A German work by Voigt, and other still more ancient authors, all record, that at the time when Prussia was occupied by the Teutonic order, the province of Vitlandia was granted by them to the inhabitants of Lubeck, but every trace of this territory has now disappeared; it was situated between Billau, Brandebourg, and Balga. Pisanski, in his work on the Baltic Sea, says, that the waters constantly advance on the western coast as well as on the northern coast of Samland, and there is a tradition among the people that some long strips of land, formerly covered with forest, have been thus buried. In fact, the waves still throw up trunks and roots of trees, which evidently came from their own soil, now at the bottom of the sea. The ruins of the chapel of Saint Adalbert, formerly six miles from the sea, are now scarcely one hundred paces distant.

More Fossils.—M. Azéma has found some fossil bones of mastodons and the rhinoceros, reptiles, and some well-preserved fruits, in the parish of Sauveterre, near the district explored by M. Lartet, whose discoveries we announced some time back. We should like to ascertain whether the skeleton of the new and remarkable rhinoceros, brought from behind the Cape by the expedition under Dr. Andrew Smith, presents more affinity to the recent or to the fossil species. It seems that the new fact concerning fossil quadrumana has been succeeded by a similar discovery in the Himmalaya mountains, but which is not so curious as the circumstance of finding these animals in Europe, and, what is still more extraordinary, the comparative anatomists have determined that European species to be similar to those Gibbons which inhabit the remotest parts of Asia. M. Lartet's discoveries have given rise to much discussion in the French Academy of Sciences, the members of which body do not assign all the remains sent to them to quadrumana, but ascribe some of them to carnivora and pachydermata. Among other questions it has been debated whether or not the Gibraltar monkeys are indigenous to that rock, or whether they are brought by sailors from Africa and then let loose. It would be a remarkable proof of—(we would rather not give it a name)—if, after so many years' possession, the English could not solve this problem.

Vinous Fermentation.—M. Cagniard Latour, in his researches concerning vinous fermentation, has obtained the following results relating to yeast:—The yeast of beer is a heap of little globulous bodies, capable of reproducing themselves, consequently form an organized, and not inert or purely chemical substance. These bodies appear to belong to the vegetable kingdom, and to be regenerated in different manners. They only act on a dissolution of sugar in water when in a living state, whence it may be concluded, that, by some effect of vegetation, they disengage carbonic acid gas from this solution, and convert it into spirituous liquor. This merits the attention of physiologists, because it is developed in certain circumstances with great rapidity, even in the carbonic acid of the brewer's tub. The mode of regeneration presents peculiarities which have never before been observed with regard to other microscopic productions composed of isolated globules. They do not perish from privation of water.

Latin.—A Latin glossary has been found by M. Charles Frèry, of Commercy (department of Vosges), which he has copied, after removing the stains occasioned by damp, for the Bibliothèque Royale. It is extremely interesting, as most of the Latin words are explained in Anglo-Saxon.

Double Sextant.—Mr. David Rowland, the inventor of a double sextant, having been allowed by the Admiralty a passage to the Mediterranean in the *Princess Charlotte*, for the purpose of making a series of experiments therewith, has, within the last few days returned by the *Caledonia*. Mr. Rowland's valuable instrument has been tried with complete success in the latter ship, and we have seen a report from the Senior Lieutenant, J. A. Legard, countersigned by Captain Martin, of several observations made; among others, the following, viz. lunar distances were taken to the extent of 149° 22′; Lieutenant Legard also discovered with it a new method of observation wherein the true altitude may be determined without the central error of the instrument, or the dips of the horizon; the latitude of the ship may be read off from the instrument at once without calculation; horizontal angles for surveying purposes can be measured to the extent of 24° 0′; and the longitude can be ascertained with it, by a new method of observation. The old sextant can be converted by Mr. Rowland to a double one by mounting the arc and frame on the top of it. —*Hants Telegraph.*

The Rejected Raphael.—In 1821, under Louis XVIII., the director of the Louvre rejected a picture of St. John the Baptist, as no longer fit to grace the walls of the collection. It was bought by M. Cousin, picture-dealer, Place de la Bourse, who discovered it to be a Raphael, and proved that it was one. The civil list instantly reclaimed the picture, and, after a trial, the picture-dealer has been cast, and condemned to restore it or its value, which is estimated at 37,000f.—*Daily Papers.*

Hemel Hempsted, Sep. 1.—On Saturday last, as the grave-digger was preparing a grave in the burial ground of the Independent Chapel, Box-lane, Hemel Hempsted, he was surprised at striking his spade against a hard and hollow substance. On discovering that there was something more than earth in his way, he carefully proceeded in his work, and the result was the following curious discoveries:—1st, a Roman vase, of a globular form, about fourteen inches in height, and near three feet in circumference, composed of thick glass or talc of a fine emerald hue, containing human bones. 2nd, a small earthen vase or pitcher of Egyptian or Roman form, empty, and which was broken on one side in taking up. 3rd, a metal stand (supposed for a lamp), of very curious workmanship: a portion of it appears as if incense had been burned therein. 4th, various ill-shaped nails, much incrusted, lying around the above, supposed to have been used for the purpose of fastening together a chest or box to contain the articles as above, which from the time must have long since perished. These articles were found about from three to four feet below the surface of the earth, and are now in the possession of Mr. Girton, who will be happy to gratify the curiosity of any antiquary or other persons desirous of seeing them.—*Windsor Express.*

TO CORRESPONDENTS.

F. J. S.—J. B.—R. M. M. received.

We are obliged to J. L. G., but the information is not sufficiently precise.—Also to C. B., but the subject was considered at the British Association, and our report is full and sufficient on the subject.—The verses by C. S. on —— picture can only be inserted as an advertisement. It appears to us, that the printseller who is about to publish an engraving of it, had better follow the example of Warren the blacking-maker, and keep a poet attached to his establishment.

In consequence of the facilities afforded for the transmission of English journals to the Continent, the STAMPED ATHENÆUM is now forwarded direct from the London Office. Subscriptions, for not less than Three Months, to be paid in advance, will be received, as heretofore, by M. Baudry, 9, Rue du Coq-St.-Honoré, Paris; and by our Publisher, at 2, Catherine-street, Strand, after the following rates, *regulated by the Post Office charges*:—

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Account of the last Parachute.
Lake to October.
The Phantom Ship, by Capt. Marryat.
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